approach

MARCH 1980 THE NAVAL AVIATION SAFETY REVIEW

We've got plenty of "Green"

UNFORTUNATELY, the *green* we have plenty of is not money, but *green* (i.e. – inexperienced) aviators. This situation has been brought about by a number of factors, including low retention of experienced pilots, lower numbers of flight-hours available, and lack of combat experience. All of the communities in naval aviation have been adversely affected by this phenomenon to some extent, but our single-piloted TACAIR squadrons seem to be feeling the pinch the worst.

Several of our mishaps last year brought this problem into sharp focus and indicated that naval aviation has entered a new era. Our aircraft are no longer manned by combat seasoned flightcrews who have flown hundreds of missions together and are intimately familiar with all operations of their aircraft. We are in an era requiring aviation fundamentals, detailed briefings, flightcrew indoctrination, outstanding leadership, adherence to established procedure, and the gaining of experience. If recent trends in the retention of naval aviators continue, this problem will undoubtedly get worse before it gets better.

The obvious solution to the problem of inexperience is to **get more experience.** This could be done by unloading huge numbers of available flight-hours onto our squadrons, but this would be like shifting our automobile directly from first to fourth gear in order to **get more speed.** The ultimate solution is a methodical process of gaining experience, and by its very nature, this process will take time.

Pressing operations beyond the capabilities of the personnel involved will only result in more broken aircraft and more fatalities. This can be a result of real or perceived pressure from the top to get the job done at all costs, or of personal pressure on the part of the flightcrews themselves. Many of our mishaps would not have occurred had the flightcrews put these pressures into perspective and used their common sense to call a halt to a deteriorating situation. Common sense is gained from experience, however, and the level of common sense in an inexperienced aviator is inherently low.

It will take thorough **planning** and **preparation,** outstanding **management**, religious adherence to all **procedures,** a lot of **common sense,** and a considerable amount of **patience** in order for naval aviation to successfully get through this most difficult period. One measure of this success will be whether or not we have enough aircraft left to fly when we've reached the desired level of personnel experience. In other words, we've got to turn our *green* into *old salt* without inordinate losses of material or men. ◄

INCORRECT ISSUE NUMBER
SHOULD READ NUMBER 9

Vol. 25 No. 8

approach

NAVAIR 00-75-510

The F-14 Tomcat on this month's cover was painted by APPROACH artist Blake Rader.

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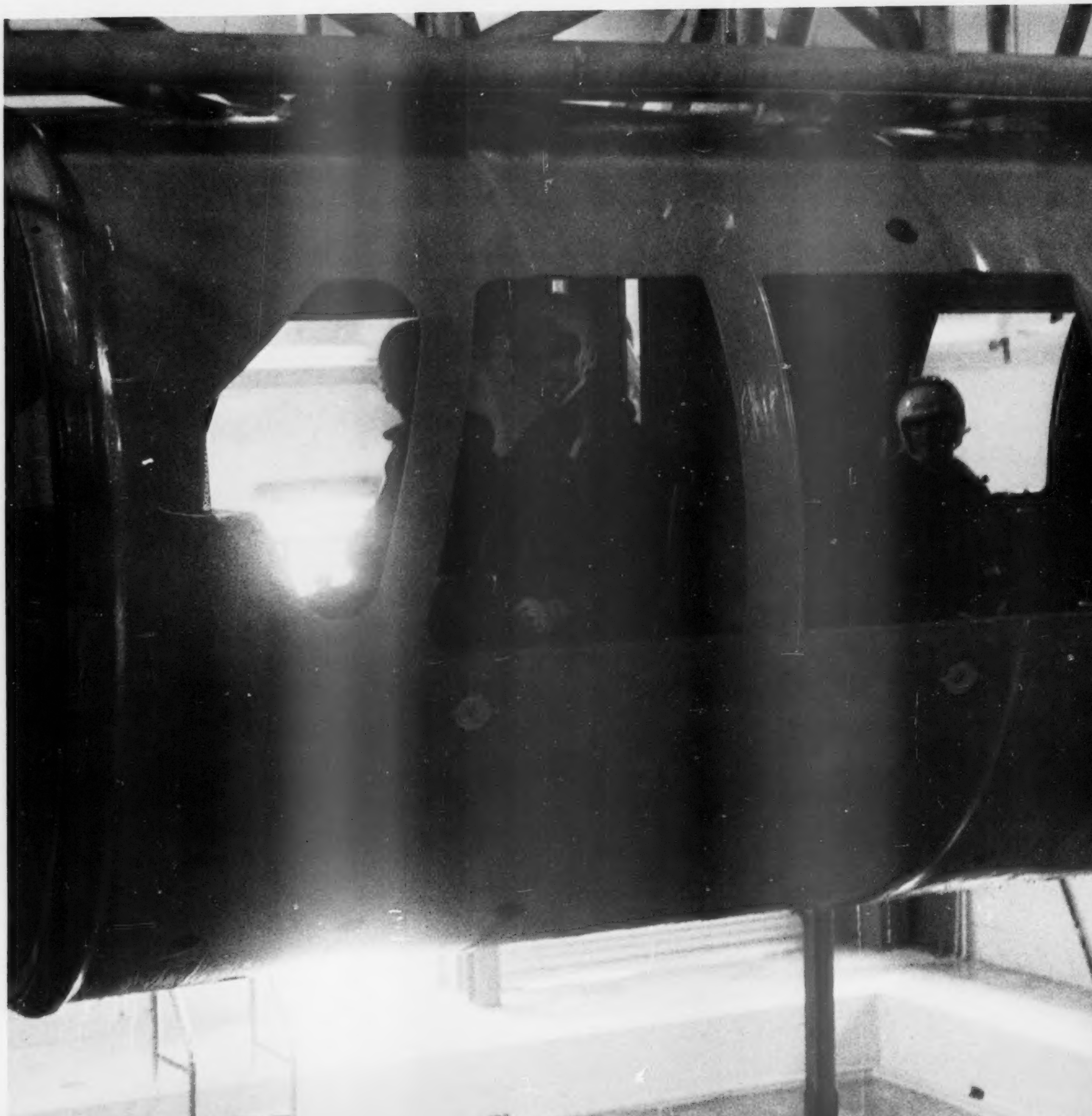
emergency



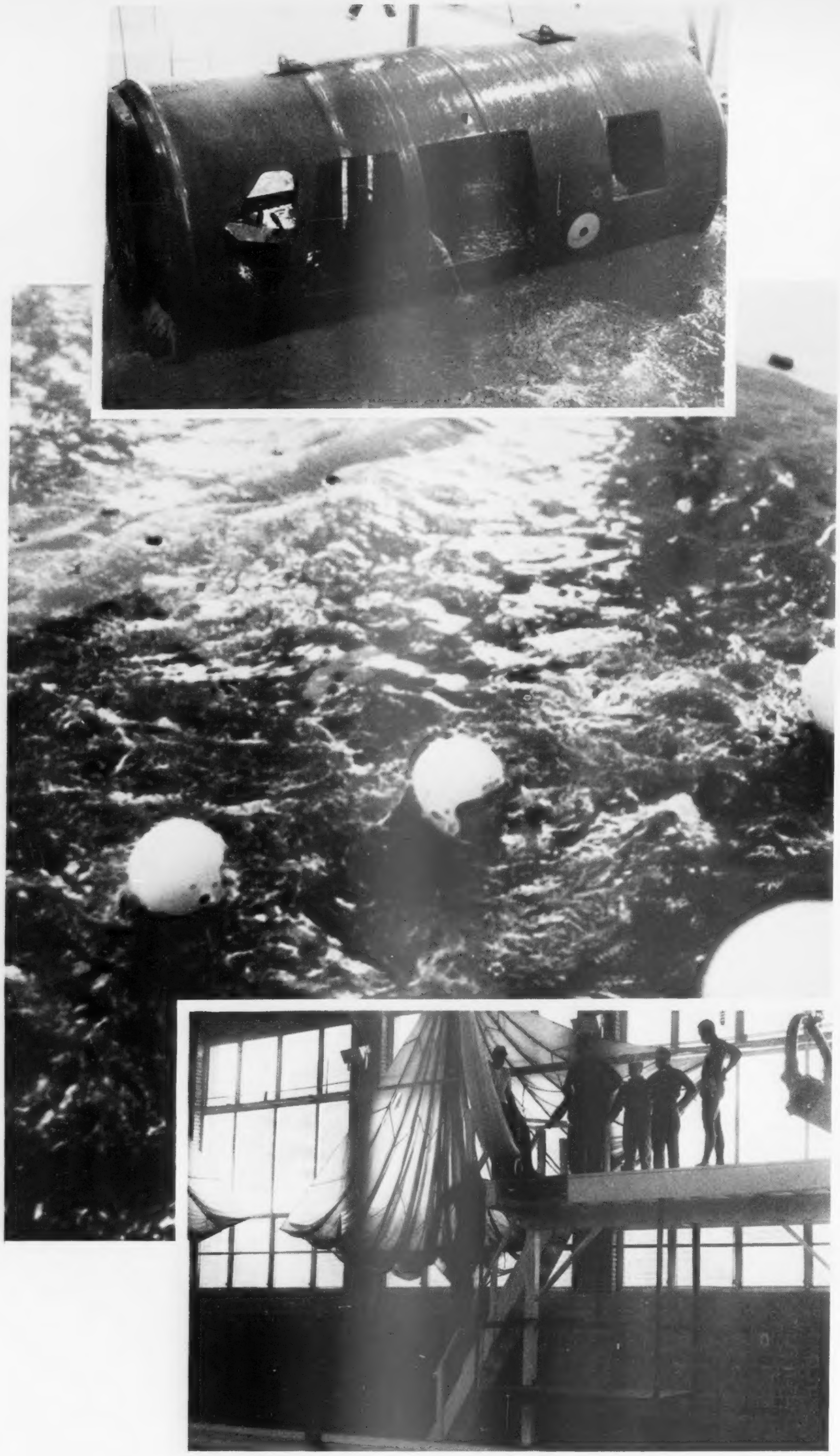
egress trainer

By LCDR Hal Freybe
LT Dave Pranke
HS-9

PLACE yourself in the following situation — a helicopter pulls into a dip on a dark, no-horizon night. You're tired, and it's the "umpteenth" dip of the night, but the aircraft has been very dependable. Suddenly, without warning, an engine drops off the line and the helo crashes into a rough sea, rolls inverted, and starts to sink! Cargo and wreckage is strewn all around you in a now dark, unfamiliar, water-filled cabin. Your lungs are bursting and you're groping for the exit you thought you knew so well. You feel panic set in! What would you do now?

You say that wouldn't happen to you, that you're a fixed-wing aviator. You never fly as a helo passenger. I doubt it! Even if you eject or ditch and you're successfully recovered by a helo, your survival is not yet assured.

Even so, consider the COD or an E-2 coming down the glide slope on a night CCA. Needles are centered, power and attitude are good, the pilot calls the ball. Touchdown is smooth, military power is applied, the cable



snaps, and the aircraft continues off the angle. Without enough speed to remain airborne, the aircraft plows into the sea. What do you do?

Or you are riding comfortably in a C-9 en route to a NAS at night. The approach begins, the "Fasten Seat-belts" sign comes on, and the flight attendant tells you to raise your seat back to the full upright position. You feel the aircraft descend, but strangely, you don't see any lights out the window. Suddenly, there is a rough jolt, you are thrown forward, and the cabin begins to fill with water! Your mind races desperately. Was that emergency exit two seats forward, or was it one seat behind? To add to your plight, flailing arms and legs are every-where as wild confusion fills the cabin. Now what?

If you'd like to find the answers to these rather bleak questions before you're ever placed in such a situation, you should visit the Navy's 9D5 multi-placed ditching trainer at NAS Pensacola. The trainer is run by the Naval Aviation Schools Command and operated by highly qualified and very professional Navy divers. Their sole purpose is to give you the training and confidence necessary to get out of extreme situations.

Training given to the Fleet can be completed in an afternoon. The class begins with a narrated presentation on the 9D5 trainer, a brief on the procedures to be used in the training, a tower jump, and a short swim to ensure that you still remember the basics of water survival. The instructors explain how the 9D5 works and what you have to do to get out of it. After this, it's off to the rather ominous looking trainer, and here the fun begins.

The trainer itself is a large cylindrical frame supported above a

APPROACH (USPS 016-510) is a monthly publication published by Commander, Naval Safety Center, Norfolk, VA 23511. Subscription price is $15.00 per year; $3.75 additional for foreign mailing. Subscription requests should be directed to: Superintendent of Documents, Government Printing Office, Washington, DC 20402. Controlled circulation postage paid at Norfolk, VA.

pool by wires. The occupants, in full flight gear, are strapped into the trainer and are told to stay strapped in until the trainer is completely submerged. When released, the trainer drops into the pool and rolls inverted. It can be rolled either right or left, so you don't know which way it will go until it hits the water, and even then, as vertigo sets in, you're not sure. When under water, the pilots, crew, and passengers release their seatbelts and exit the trainer via escape hatches and a cabin door. Each crew takes four runs, so each person gets to try an escape from every position. On the first run, the crew and passengers simulate releasing windows and exiting the trainer. The second run simulates the windows being jammed, so everybody must exit via the cabin door.

The last two runs are the real test. They're the same as the first two, but now you are *blindfolded*! Exiting your window is easy, but leaving your seat for the cabin door makes believers out of skeptics. You are taught not to trust your senses, except for what you can feel and recognize. It's a topsy-tervy world, with bodies, arms, and legs everywhere. You must get out without the diver's aid to pass, and some pilots and crews with thousands of hours of flight time make repeated runs to finally pass.

Safety is a primary factor in any training, and here there is no difference. There are two divers in the pool at all times, and they have easy access to every area of the trainer. They are also in direct communication with the trainer operator who debriefs the crew on their performance after each trainer run.

The trainer run is interesting and fun, but the greatest benefit comes from the experience of having to escape from an aircraft cabin while submerged in an inverted position. It's a tremendous confidence builder and a thousand percent improvement over the Dilbert Dunker. When you break the surface of the water after your last blindfolded trainer run, exhilaration hits you as you realize that you have just received the best kind of life insurance available.

The comments received from both pilots and aircrew, some of whom were survivors of actual helicopter crashes at sea, were very positive. One recommendation was that all aviation personnel receive this training.

Long overdue, these trainers will eventually be installed at water survival schools throughout the Navy. If you have any questions, or have a group that would like to go through the trainer, call the scheduling office at the Naval Aviation Schools Command in Pensacola.

This is one trip that may save your life!

air breaks

T-34C Inverted Spin! In the annals of naval aviation, every instructor has been forewarned — BEWARE . . . expect the unexpected, particularly of the SNA (Student Naval Aviator). IPs (Instructor Pilots) are a proud lot, and most have experienced just about every *expected* or *unexpected* trick that the SNA could pull. Enter yet another unexpected maneuver — the *inadvertent inverted spin* of the T-34C.

While on a dual training flight, the SNA entered a prebriefed *upright* spin at 9000 feet MSL. During the recovery he applied excessive forward stick and the aircraft tucked under, went past the vertical, and ended up in an *inverted* spin! The IP took control of the aircraft and applied the proper recovery techniques for an inverted spin. Passing 5000 feet, the IP ordered the SNA to prepare to bail out of the still spinning aircraft. The T-34C's rotation stopped after three revolutions, at about 4500 feet, but due to insufficient roll rate at 220 KIAS, the aircraft was unable to roll *upright*. Assessing the situation correctly, the IP "split-S'd" the aircraft and was successful in righting it to a straight-and-level attitude just below 2000 feet MSL! Max airspeed and G forces during this unexpected and unplanned maneuver were 325 knots and 4.8G. A slow flight check showed no unusual characteristics and the *TurboMentor* returned to the line, where a postflight overstress inspection revealed no ill effects (craft nor crew).

Once again it goes to show you, IPs must be constantly aware and alert for the *unexpected* from both the SNA and the aircraft. They do the damndest things at the damndest times! Stay at least one step ahead of both. Know them like a book — NATOPS — and prevent a mishap as did this "on-his-toes" IP. Well done, LT Dave Brookshire of VT-3!

Musical Chairs. While at 9000 feet in a T-44A on a FAM-2 flight, the "student seat switch" commenced. As the student in the left seat egressed from his position, he inadvertently secured the left firewall shutoff valve, thereby causing the port engine to quit! The IP (instructor pilot) in the right seat completed the engine shutdown checklist, as required, then restarted the engine, and the flight continued without further incident.

IPs, BEWARE! The *King Air*, still relatively new to the Training Command, is not sailor/marine proof. The engineers design aircraft (hopefully) to prevent happenings of this nature, but until the machines get the final test of the student — anything can happen, and usually does. The unintentional, unwanted, and unthought of usually arise when least expected, even though the experts said, "It couldn't be done!" Once again, instructors of all type aircraft — keep your guard up at all times, for there is no telling what the fledgling aviators-to-be will "inadvertently" try next.

This type occurrence does not only happen in the Training Command. It happens in the Fleet as well. Everyone, keep up your guard when fighting for SAFETY. — Ed.

Jockeyless Joyride. In the Air Breaks section of the MAY '79 issue, reference was made of a helo mech, neither GSE licensed nor permitted to use a tow tractor, who damaged an H-53. Not to be outdone by the rotary wing community, a fixed-wing squadron plane jockey went on his unqualified, unauthorized ride. Had *Corsairland* received the May issue sooner, maybe the following mishap could have been prevented — that is, if the "jockey" would read and heed!

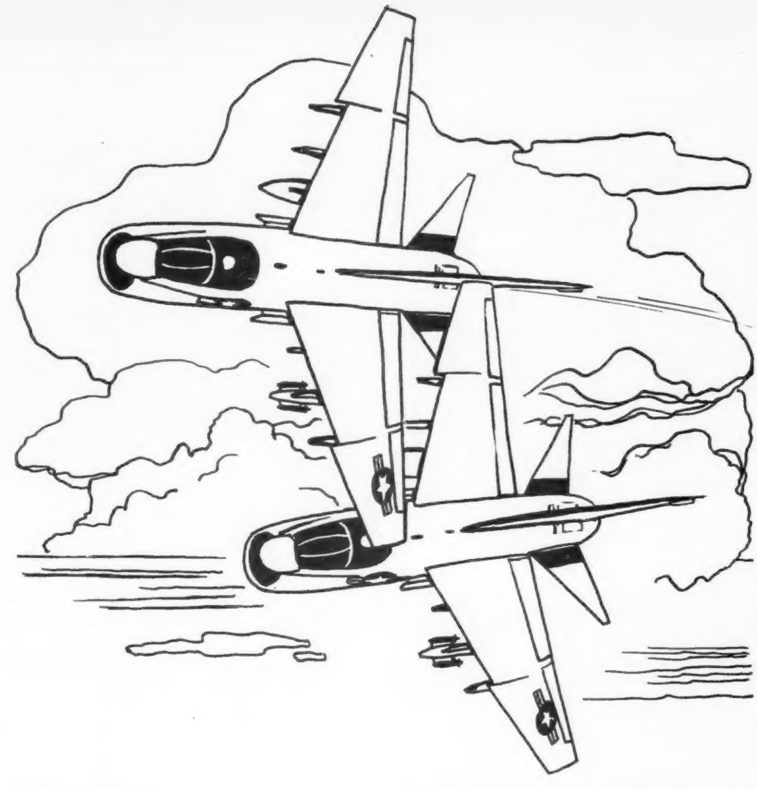
After the AOAN relieved the 2000-2400 line watch, he got into the ordnance shop's Cushman *Truckster*, which was parked in the hangar. As he drove out onto the line area, he passed in front of *Corsair No. 1* and made a port turn to circle the A-7. After approximately 270 degrees of turn, the right forward corner of the *Truckster* bed contacted the port UHT of *Corsair No. 1.* The airman was then thrown out of the *Truckster*, and it continued (driverless) into the right side of *Corsair No. 2*, where it finally came to rest!

This was another case of an unqualified and unauthorized individual trying to "do his thing." Just what provoked him to go for a

joyride, while he was supposed to be standing watch in the first place, may never be known. Not only did he neglect his duties as a watchstander, he misused GSE equipment. This ended up causing damage to two expensive aircraft and an ordnance vehicle. Hopefully, the messages of responsibility and safety get across in time – next time!

Tail Chase(d). Two mature and capable A-7 pilots, both well rested, prepared and briefed for a combination SECTAC/ORD hop from the carrier. This type hop and its identical maneuvers had been performed previous to the forthcoming mishap, indicative of the level of proficiency of the pilots involved. However, a momentary lapse in attention and failure to correctly recognize an untenable situation nearly resulted in a tragic accident.

The two *Corsair IIs,* configured with one 300-gallon fuel tank and one MER containing six MK-76 practice bombs apiece, launched and rendezvoused. They were vectored to a clear area near the ship to conduct the *prebriefed* section tactics portion of their hop, prior to ordnance delivery practice. The first three wingovers were done to perfection by the wingman, according to his lead. The fourth was commenced, and when the lead approached the 25-degree, noseup, 80-90-degree bank position, he noticed that "wingie" was getting slightly acute and increasing his lateral separation. As the lead *Corsair* passed through the horizon, he observed his wingman closing a tad fast on the acute line. Sensing a possible collision, the lead pulled hard and to the left. At that time, *both* pilots felt a "thump," similar to flying through jetwash. The flight broke it off and visually checked each other for possible damage. Dash 1's starboard wingtip was damaged and Dash 2's ECM fairing was later found to be damaged. Both dented aircraft returned to the "birdfarm" without further incident.



There is not much more that can be said about mishaps of this nature, particularly when they are done by a "couple of the best." When performing demanding maneuvers, total attention must be given 100 percent of the time. If not, mishaps usually result!

Pro of the Month

AT approximately 1140 on 8 August 1978, AD3 Finley McManus of HELSUPPRON THREE Det 103 was performing duties as plane captain/LSE for a CH-46D. Another squadron aircraft taxied past when AD3 McManus noticed that the hydraulic oil cooler access panel on the port side of the aft pylon was loose and flapping.

Other personnel in the line area also noticed the panel and were pointing to it; however, no one was taking any action. AD3 McManus gave his pilot a hold signal, ran in front of the discrepant helo, and gave them a hold signal. After it stopped, he gave the pilot a signal to cut No. 1 engine. When it was secured, McManus again gave the pilot a hold signal and proceeded to the port side. After checking the engine to ensure it was shut down, he properly secured the loose panel. He then went to the front and gave the pilot the signal to start No. 1 engine, subsequently turning over directing duties to another plane captain from the line division.

Petty officer McManus' alertness and prompt action probably saved the loss of a panel in flight, or damage to crew and aircraft due to FOD. A well done to a solid Navy professional.

Night recovery?

NO SWEAT!

By LT Edward C. Parker
VF-213

NIGHT recoveries aboard a carrier, regardless of full moons and CAVU weather, require the utmost concentration from the aircrew involved to safely trap aboard. Add a few nonstandard occurrences to a routine night training mission, and a no-sweat night recovery can become a "white-knuckled" nightmare.

I was a crewman in a section of F-14s launched on a night AIC mission during transit cyclic ops aboard USS BOAT. After night tanking, we pressed on and completed our assigned mission. After the final intercept was completed, the leader broke up the flight for individual check-in with Marshal. After several routine delays, we started our "standard" CV-1 approach with the weather reported as 500 scattered, 1200 broken, and 3 miles visibility. Fuel dumping was held to 4 miles aft of the ship to guarantee max trap since this allowed only two passes prior to bingo. At three quarters of a mile, we called the ball with max trap fuel. At one-half mile, a foul deck waveoff was initiated. We climbed to 1200 feet and were told to "turn downwind and report abeam with state." This call was questioned by the aircrew due to a known, earlier waveoff of a preceding aircraft who was still upwind. After several extended moments of silence, CATCC acknowledged and again directed us to turn downwind and report abeam with state. With no further ado, we began a level turn to the downwind heading. With 20 degrees to go, we sighted a flashing red light, through the broken to overcast layer, that appeared to be level and just off the port wing. CATCC was questioned on a possible traffic conflict, to which the reply was, "Negative, that's the tanker; level at 2500 feet." We then went popeye, but held our altitude level at 1200 feet. Upon breaking out, the pilot observed the previously sighted aircraft closing rapidly on a collision course approximately 1000 feet off the port wing and apparently level! We suddenly executed a hair-raising avoidance maneuver, leveling at 800 feet and barely missing the stranger by passing just underneath! After a few flustered comments to CATCC and a subsequent settling of nerves, we trapped aboard on our next pass and stumbled to the readyroom, a bit older and a lot wiser.

Several things contributed to this near-disaster which could have easily been avoided:. 1) The near-miss aircraft was a low state A-7 who had turned downwind without direction from CATCC. He had not continued for 2 minutes or 4 miles upwind as NATOPS specifies. 2) CATCC mistook the Alpha-7 as the night "hawk" tanker and thought he was at 2500 feet. 3) The seemingly overconfident attitude of the CATCC controller was a significant factor.

It was only by luck that we first spotted the A-7 through a break in the clouds and were alerted to his presence. It was only luck that we broke out when we did to see the A-7 on a collision course and were able to avoid a sure collision. And, finally, it was luck that this turned out to be a "no-sweat" night recovery.

Hours of boredom...?

By LT Martin R. Hill
VP-46

IT had been a long tedious night! Our preflight started at 1430 the previous afternoon, with a takeoff at 1800 for an 11-hour operational, ASW investigation in the southern sea of Japan.

The weather on station was basically miserable; cloud layers from the deck all the way up, low visibilities, moderate turbulence, icing, and occasional snow showers. After an exasperating on station period, with negative results, we called off station and commenced our transit back to our deployment site. The crew was really drained by the time we arrived overhead Homebase. Flying an 11-hour flight, all night, in solid IFR weather without an autopilot is bad enough, but to include low altitude ASW patterns in turbulence – whew!

We arrived overhead at 0530 and requested a GCA due to the weather – 300-500-foot ceilings, visibility 1-2 miles in snow showers, RCR of 14 (with snow on the runway), and a 15-knot crosswind component. Challenging, to say the least. While on dogleg to final, the landing gear was selected down. The port and nose gear came down and locked as advertised, but the starboard gear remained up.

At first we hoped we had an indicator problem, but when the aft observer checked it, he confirmed it up and the landing gear doors closed. We immediately tried cycling the gear, with no success. To put the situation in perspective, we were at 1500 feet on radar vectors, solid IFR, at night, in mountainous terrain, talking to foreign controllers, with just slightly above the minimum on-top fuel requirement.

Since our nearest suitable alternate was over an hour and

a half away, considering 70-knot headwinds, we had to make a quick decision as to whether to stay around Homeplate and troubleshoot or make an immediate divert. Adding to the confusion, when we declared the emergency, the controller became very confused, stopped issuing vectors, and his English deteriorated rapidly.

Noting the position of the aircraft relative to high terrain, we requested a climb, which was approved. After reaching a higher altitude, a decision was made to divert to our alternate. Factors considered included warmer temperature, better weather, a longer runway with better crash facilities, and American controllers. If we were able to solve our problem while en route, we would also be able to obtain P-3 maintenance services at NAS Nearby, just a few minutes away from our alternate airbase.

While the flight station crew was obtaining clearance and working on troubleshooting, the TACCO (tactical coordinator) contacted the squadron via radio and informed them of our difficulties and intentions. The NAVCOMM (navigator and communicator) contacted en route airways, was able to obtain the alternate weather forecast, and also set up a phone patch back to the squadron, anticipating the loss of UHF base radio during the transit.

Squadron reaction on the ground was immediate and decisive! The CO, ops officer, and safety officer were quickly notified, and maintenance personnel were contacted for troubleshooting suggestions. The CO and a senior PPC went to the local control tower to establish communications with the flight crew and to aid with any language difficulties. Back in the air, the crew was brainstorming every known procedure to try and get the starboard gear down.

The flight engineer, an FE instructor in the squadron, went to the back of the aircraft to attempt manual release procedures. After trying several times, without success, he reported that he was unable to get the starboard gear down. While my copilot was reporting this to base, I decided to make a personal attempt using the manual release system. After entering the hydraulic service center, I pulled on the manual release handle, which released the port gear everytime, but the starboard gear still remained up. However, it was noted that the release cable felt like it was hanging up slightly at the end of its normal travel.

With the anxious anticipation of making a gear-up landing (and a short prayer), I made a last hard pull. The cable came out an additional 6 to 8 inches, a clunk was heard, and the starboard gear finally released and indicated down and locked! After returning to the flight station, the nose gear was extended and all three gear were (thankfully) in place. Reassessing the position of the air station, fuel state, and after a quick check on the weather, we decided to return to Homeplate for a final landing. The approach and landing were normal for winter at Homeplate. After rollout, and a big sigh of relief, the crash crew pinned the gear.

After the postflight, the exhausted crew was bedded down, and maintenance began an investigation into the inflight problem. The aircraft was brought into the hangar for dropchecks, and all systems were checked thoroughly. Maintenance personnel could find nothing wrong! Dropchecks were absolutely normal, and over 50 additional drops were made using normal and emergency release procedures with absolutely no malfunction indicated. The only unusual thing noted was that, try as they might, no one could get the manual release cable to extend farther than 4 inches; 8 inches less than the successful airborne tug.

Although all systems operated normally, the command decided to fly a maintenance checkflight on the bird prior to releasing it for flight. The checkflight attempted to simulate, as closely as possible, the original conditions; however, no malfunctions occurred. The aircraft has subsequently been flown repeatedly without incident.

The primary reason for this article, in addition to reporting an unusual incident, is to point out that crew coordination helped keep this incident from becoming an accident! If we had tried, we couldn't have found more deplorable conditions for an incident of this type to happen: night, IFR, lousy weather, foreign controllers, and a fatigued flightcrew. All these factors, coupled with an unusual malfunction, could easily combine to create the elements of an accident. Balanced against these odds were the coordinated efforts of a crew of 12 and the smooth response of the squadron experts on the ground.

One important point that should be emphasized is that when the gear didn't come down initially, the crew did not panic. Crewmembers in the back of the aircraft did not attempt to ask questions or interrupt flight station personnel at any time. Although it is human nature to want to know what is going on when something unusual happens, no one got in the way or in any way created additional confusion. The crewmembers that could help performed without being asked or requiring any prompting. The flight station personnel commenced troubleshooting, obtained revised clearances, and flew the aircraft like a well-oiled machine.

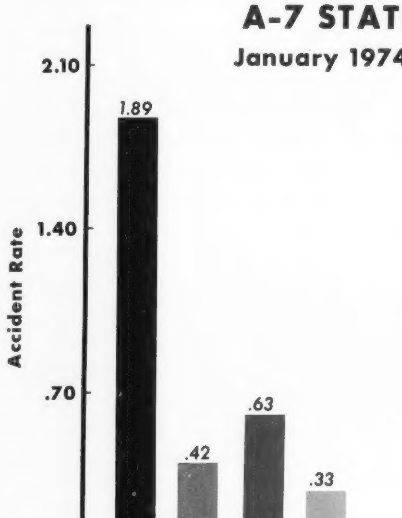
The squadron ground effort was of great assistance. Even at 0530, personnel were contacted promptly and were available for consultation. After landing, the crew was amazed to find out that from the time the gear was first lowered, until touchdown, only 30 minutes had gone by. (It seemed more like 3 hours to me). The old aviation adage, "Flying is defined as hours and hours of boredom, interspersed with moments of stark terror," really hit the nail on the head!

Aviation Safety vs. Pilot Experience

By Dr. Michael S. Borowsky
Ms. Gloria B. Barrett
LCDR Art Beck
Dr. John Gaynor
Naval Safety Center

IN the OCT '78 issue of APPROACH, an article entitled "Is Experience the Key?" was published. The article considered the relationships between a pilot's flying experience and his accident potential. Based on examination of the A-7, A-6, and F-4 communities, the article made certain general conclusions which pointed to several time frames within a pilot's career in each community where the accident rate is significantly high.* The results of further statistical study (which have been updated to include CY-78 accidents) follow, along with some analysis of each community's accidents and some general recommendations.

A-7 STATISTICAL DATA
January 1974 - September 1978



A = *RAG/New Aviator Assigned Directly to A-7 Squadron: 0-450 hours all models*

B = *Pilots With Additional Experience (less transitioning pilots): over 450 hours all models excluding group C*

C = *Experienced Aviator Transitioning Into A-7: over 1000 hours all models and 0-400 hours in A-7*

D = *Experienced Aviators: over 1000 hours all models and over 400 hours in A-7*

A-7. As can be seen in the accompanying chart, new pilots going through the A-7 RAG have a significantly higher accident rate (1.89) than the other categories considered. Also, pilots who have greater than 1000 flight-hours in other type aircraft, and are transitioning into the A-7, exhibit a higher rate (.63) through the accumulation of more than 400 A-7 hours. Obviously, the inference is that pilots in these categories have a proportionately higher accident potential.

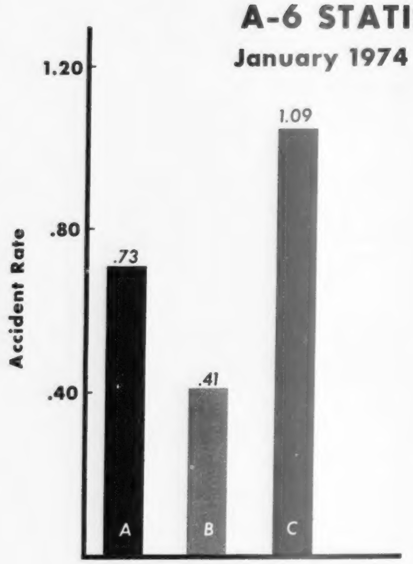
Analysis of these A-7 accidents reveals several departures/stalls/spins that indicate a lack of awareness of the aircraft's aerodynamic characteristics. Another problem area is that of midair collisions. Several midairs occurred while in formation, with the wingman striking the lead. Another midair occurred while turning downwind at the ship. All midairs involved a scan breakdown, and in one case, the wingman was put in a box by trying to comply with a nonstandard procedure. In another midair, the pilot was No. 4 in an echelon formation (i.e., on the end of the whip).

Other mishaps, including collision with the ground during low-level operation, a wheels-up landing, ramp strikes, and development of a high sink rate on final approach, point to distraction or inattention. Continued

** Statistical tests were performed at the .05 level of significance. Detailed data, data sources, and statistical tests are on file at NAVSAFECEN.*

A-6 STATISTICAL DATA

January 1974 - September 1978



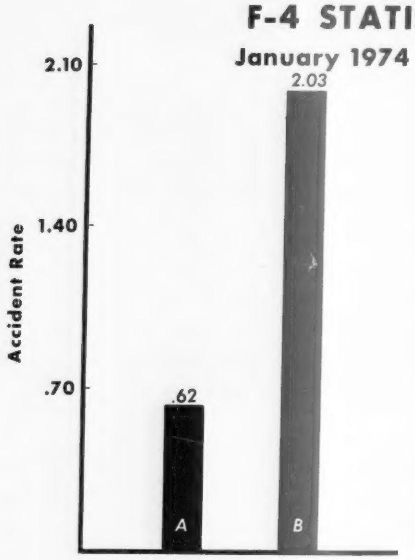
A = RAG/First Tour/New Aviators: 0-1000 hours all models and 0-400 hours in A-6

B = Experienced Aviators: over 1000 hours all models and over 400 hours in A-6

C = Experienced Aviators Transitioning Into A-6: over 1000 hours all models and 0-400 hours in A-6

F-4 STATISTICAL DATA

January 1974 - September 1978



A = RAG: 0-150 hours in F-4

B = Initial Portion of First F-4 Tour: 150-400 hours in F-4

A-6. The new aviator assigned directly to an A-6 squadron has high accident potential during the RAG and first tour. This potential decreases as experience is accrued.

Experienced aviators transitioning into the A-6 have extremely high accident rates. These rates significantly decrease as more A-6 experience is obtained.

As in the A-7 community, several mishaps occurred when the pilots allowed themselves to be distracted and, therefore, did not pay sufficient attention to the primary task at hand. Mishaps such as launching with the brakes set, flaming out while troubleshooting another emergency, failing to fly the aircraft while working with a particular system, simulating emergencies, and dealing with actual emergencies fall into this category.

There are also significant indications that the B/N, who was more experienced in the A-6 than the pilot in the cases considered, could have done more to help the situations. This is especially evident in several instances where the wrong emergency procedures were used.

F-4. Pilots assigned to F-4 RAG squadrons have relatively low accident rates, followed by significantly sharp increases during the initial portion of their first F-4 squadron tour, regardless of previous *all model* experience.

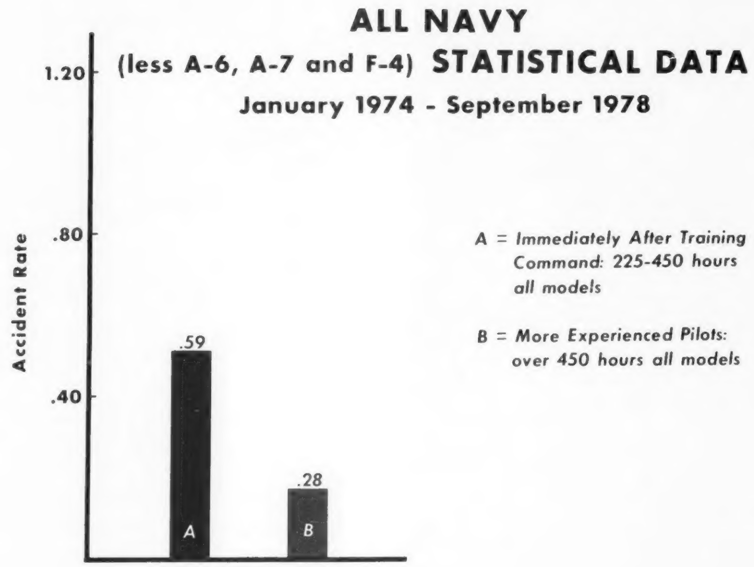
Landing technique was the outstanding problem area noted in the F-4 community, with ramp strikes, hard landings, stabilator slaps, and inflight engagements being the most common. Though there were extenuating circumstances (weather, sea state, etc.) which contributed to some of the mishaps, pilot error was still considered a major factor.

Along with landing technique, improper procedures on the ground occurred in several cases, involving no chute or a fouled chute, and resulted in runway departures.

All Navy (less A-6/A-7/F-4). Although combining aircraft models with different characteristics presents interpretation difficulties, the data indicate that the pilot factor accident rate for pilots in approximately their first 200 hours after the training command is high (and statistically significant) compared with the more experienced pilots. The rate remains somewhat stable commencing with the first tour.

Interestingly, lack of experience in model was not a significant factor in accidents studied outside of the fighter/attack community.

In general, interrupted procedures, scan breakdown in a high task environment, out-of-sequence or wrong procedures, and expediting to get the mission completed were significant contributing factors in most of the accidents studied.



Recommendations. There is a "gut feeling" for each of the problem areas mentioned here within their specific communities, and a lot of training has been tailored to address these areas. Perhaps, only by doing the things already being done, but doing them much more thoroughly, can the pilot factor accident rate be positively affected. Some specific recommendations follow:

- Use simulators more extensively, particularly at the Fleet squadron level, to train for specific emergencies as well as complex situations caused by aircraft emergencies coupled with a bingo situation and/or lost communications. This will serve to keep the crew ahead of the aircraft and alert to alternate courses of action.
- Supervise each pilot more closely, and recognize his specific abilities and limitations. RAG and first tour pilots, in particular, must not be tasked beyond their capabilities.
- "Drill" into each pilot the need to fly the aircraft first. Despite all the publicity this theme gets, the problem continues. This study suggests that we cannot let up in this area.
- Examine formation flying requirements and be sensible in deciding when to continue or terminate. (Remember, it's easy to fly formation as the lead.)
- Stress, discuss, review, and demand crew coordination. A substantial number of mishaps have been attributed solely to the pilot when an attentive crewmember could have made the difference.

The Roadrunner's Parting Shot!

SAFETY awareness is not only being aware of the hazards of the task at hand, but also being aware of the inherent hazards of the total environment in which you work. The following individual blew it on both counts.

Two men were in a foot race on the flight deck, stern to bow. One airman was so intent during the final sprint that he was unable to stop at the bow – and overboard he went! Fortunately, he was recovered without injury. It's nice to stay in shape, but if you're doing it on the flight deck, you have to be extremely careful.

AD577, Ident again please.

By LT Bruce Stuart
VA-42

MIDAIR! Yeah that's something to worry about at low altitudes and near airports, right? Wrong! Flying at FL180, visibility unlimited, and under positive control, the last thing you'd worry about is a midair. How could two aircraft – a Navy TC-4C and a civilian DC-9 – under radar contact, come within 500 feet of each other, at the same altitude and on reciprocal headings?

This was to be an uneventful instrument check to NAS Northeast and back. Flight planning and the weather brief went smoothly. At FL180 it was to be clear, with 7+ miles visibility. The drive north went smoothly. After numerous approaches, failed gyros, lost comm and holding, it was decided to take a break and refuel. Checking the weather once again, it was to be a smooth and clear ride back.

Leveled at FL180 heading southwest, things started to deteriorate when the controller asked for repeated IDENTS (there had been no previous gripe on the transponder). At the same time, other aircraft were also asked to IDENT. About this time, a civilian DC-9 was spotted at 12 to 1 o'clock with a *rapid* closure rate. A hard left by the DC-9 and a surprised left turn by the TC-4C averted the midair. VHF communications were established with the airliner, and the controller was queried as to what the *!?† happened.

It seems as though a computer problem had failed the controller's synthesized radar picture and he was attempting to reestablish radar contact through raw video. Prior to the failure, the DC-9 had been cleared to descend through FL180. When the failure occurred, the TC-4C's position could not be determined, thus two aircraft ended up in approximately the same airspace. Two very wide-eyed pilots returned to base, where a call from Center was waiting for them to explain the events.

The purpose of relating this incident is not to place blame on controllers or the IFR environment. Many a pilot has been damn glad to be in radar contact or have a controller giving him vectors out of weather. Aircraft operate successfully in this environment every day with very few incidents. However, it is still the pilot's responsibility to keep his head out of the cockpit whenever he can. There are several ways we can help ourselves:

1. When practicing approaches or simulating IFR, make sure the other guy (copilot, crewman, etc.) does keep his head out of the cockpit.

2. Abide by the regulations of flying IFR. When you have to be VFR for FAM work or postmaintenance check flights, make sure you communicate your desires to the controlling authority and ask for radar advisories.

3. Monitor VHF and use it if you have the ability. It seems to make sense, since most everyone else is using it.

4. Know the area and environment you will be flying in. Do most of the aircraft fly IFR or VFR? Where will I encounter the most traffic?

5. KEEP YOUR HEAD OUT OF THE COCKPIT. What many aircrew fail to realize is that a controller's job is to provide separation for IFR traffic. Calling VFR traffic is one of his lowest priorities. If he has time, he will gladly call any aircraft, but it is ultimately up to the pilot/flight leader to provide his own separation from VFR traffic. Remember that the next time both aircrew have their heads buried in the cockpit looking for the right approach plate, or looking for that dropped pencil.

Midairs have gotten a lot of attention lately. By employing a few of these practices, you can minimize your chances of occupying the same airspace as someone else. The bottom line is that near-midairs are going to continue to happen. It is up to the pilot in command or flight leader – not the controllers – to use every available source to keep near-midairs just that – *near*-midairs. SEE and AVOID!!

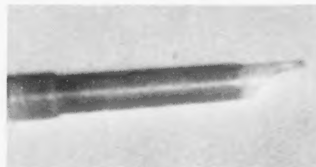
NIGHT LIGHT

By LCDR R. D. Curry
HC-9

DROWNING fatalities during helicopter night ditchings are unnecessarily high. A causal factor is cabin occupants' inability to locate egress routes due to darkness and/or disorientation. This is aggravated by potential aircraft electrical power failure.

The Cyalume Lightstick offers an inexpensive and maintenance-free solution to the hazard without affect on night vision or dependency on aircraft electrical power.

Each helicopter cabin exit could be configured as shown, with an Adel clamp mounted immediately above and centered over all exits. Prior to night launch, Lightsticks would be actuated and installed, as well as passengers thoroughly briefed on their purpose.



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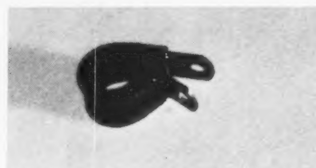

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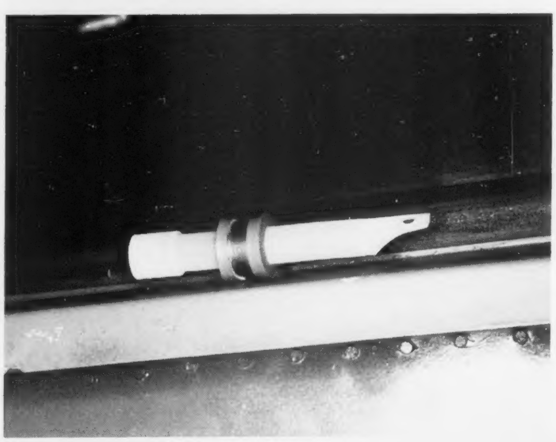
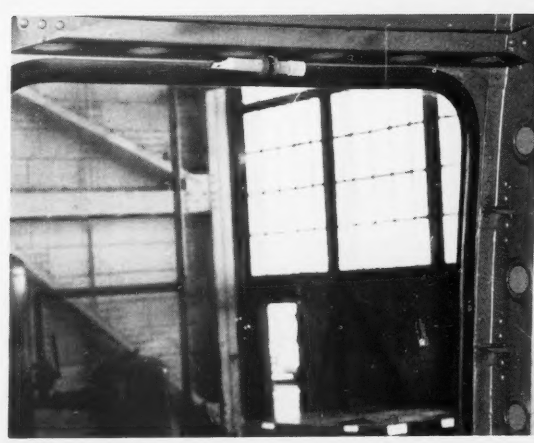




Who's responsible here?

By LCDR James M. Burin
VA-128

DURING World War II, there were some very peculiar mishaps during group gaggles. One mishap involved some dive bombers, off the coast of Florida, in which the leader was run into by a wingman during a hot run. The wingman had been advised to wait 10 seconds before pushing over.

Another mishap involved a section on a similar bombing/tactics flight. The wingman was delayed in taxiing out, so lead went without him. However, the lead told No. 2 to meet him over the target. The lead found clouds in the target area when he arrived but began his run anyway. He dove through the clouds, found some breaks, picked up the target, and dropped his bombs – although he wasn't under solid clouds until he passed through 500 feet. The lead climbed back up, above 10,000 feet, rendezvoused with his wingman, and cleared the wingman to go hot. Apparently the wingman didn't dive through the same cloud breaks, because he went straight in.

Mishaps such as these occur with unfortunate regularity even today. In all these cases, properly qualified and designated individuals are responsible for the conduct of the mission, yet fatal mishaps often result. Who is in charge and what are their specific responsibilities?

Responsibility in naval aviation is something that is well defined and is a keystone to our professionalism and our reputation as an elite aviation organization. Unfortunately, responsibility is all too often not understood and not discussed until it is too late, or until a mishap board must address it. This responsibility does not address who will turn on what systems, or who will monitor what instruments, and it does not address who's at fault in a mishap. The responsibility to be discussed here is the ultimate responsibility of what an aircraft will do and how

- **Pilot in Command**

"The pilot in command is responsible for the safe and orderly flight of his aircraft and the well-being of the crew . . . In the absence of direct orders from higher authority cognizant of the mission, responsibility for starting or continuing a mission with respect to weather or any other condition affecting the safety of the aircraft rests with the pilot in command. The authority and responsibility of a pilot in command is independent of rank or seniority in relation to other persons participating in the mission or flight . . ."

- **Formation Leader** (section or division leader)

"A formation of two or more naval aircraft shall be under the direction of a formation leader who is authorized to pilot naval aircraft . . . The formation leader is responsible for the safe and orderly conduct of the formation."

it will do it. The definitions below are a brief summary of what is expected of naval aviators. They show, in effect, a chain of responsibility similar to a chain of command. These definitions are portions of the statements of responsibility given in OPNAVINST 3710.7J (pgs. 2-8 and 2-9).

Now, let's look at what these words really mean to us. Almost all pilots are at the initial point of the chain of responsibility; i.e., they are pilots in command. In tactical aircraft, a pilot is the pilot in command from day one. He is thus responsible for the conduct of its mission, unless he has "direct orders from higher authority cognizant of the mission."

An example of this higher authority would be a formation leader. If there are two or more aircraft under the direction of a formation leader, the pilot in command is now only responsible for the physical control of his aircraft, while the formation leader (section or division) is responsible for the conduct of the mission. The formation leader is the next step up the chain of responsibility, and he must be a pilot, but not necessarily the pilot in command (e.g., the formation leader may be in the right seat or back seat of one of the aircraft).

Next in the chain of responsibility is the highest level, that of mission commander. This individual can be a pilot or an NFO, and he is responsible for all aircraft in his flight, be it one or twenty. He is thus responsible over the pilot in command and the formation leader in all aspects of the mission. However, let's not forget that the pilot in command in each aircraft is still responsible for the actual physical control of his aircraft.

The final definition given, that of instructor, shows that the instructor does not really fit into the chain of responsibility as such, but acts only as an advisor. When the instructor is not the pilot in command, he has no direct responsibility and gives only direction to the pilot in command.

How are these definitions used? In a two-plane flight, one of the pilots should be a section leader. Who leads a multiplane air wing strike? Probably a mission commander. Who is responsible if something good or something bad happens on a flight? It will not necessarily be the senior man in the flight by rank, but it will be the senior man in the chain of responsibility.

These definitions of responsibility are not to say that the senior man in the chain makes all the decisions. Decisions in an aircraft are a crew function, and should be treated as such. However, this decisionmaking process is similar to that of a CO making a decision by getting inputs from his department heads. He takes all the inputs, and he may even use the exact input of a specific person, but the CO is responsible for the decision he makes. Likewise, in the aircraft the crew must decide what to do, but the appropriately designated senior must accept the responsibility for that decision. Thus, like the CO, he also has "veto power" over decisions. Because of this power, the designation of aircrewmen to the positions in the chain of responsibility are not directly dependent on rank or hours in the aircraft, but rather on judgment, airmanship, maturity, and professionalism. When the CO designates someone a section leader or a mission commander, he is entrusting him to accept the responsibility of that position and to use the accompanying authority in a logical, professional manner. If he misuses or abuses it, he will have to answer to the CO.

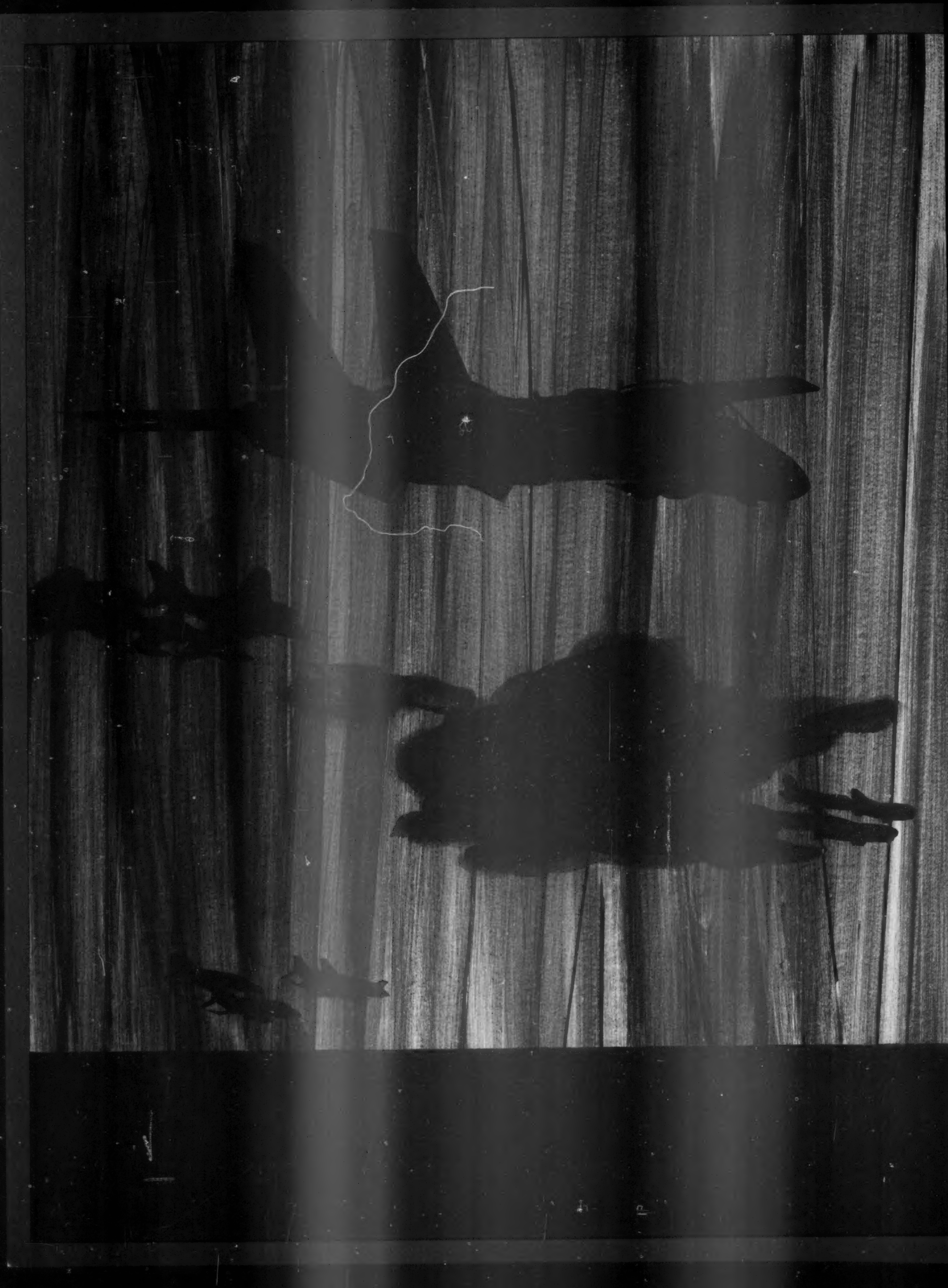
As you progress through your career in naval aviation from a third-seater or wingie to a PPC, or division leader to a mission commander, you gain more flight time, more experience and, ultimately, are given more responsibility. As you move up the chain of responsibility, it is incumbent on each of you to be able to accept the responsibility and exercise the attendant authority, so it will be obvious to all that **you** are responsible – that you accept it, understand it, and are proud of it!

- **Mission Commander**

"The mission commander shall be a properly qualified naval aviator or naval flight officer . . . The mission commander may exercise command over single naval aircraft or formations of naval aircraft. He shall be responsible for all phases of the assigned mission except those aspects of safety of flight which are related to physical control of the aircraft and fall within the prerogatives of the pilot in command."

- **Instructor**

"The instructor will be charged with authority and responsibility to provide appropriate direction to students to ensure safe and successful completion of each training mission . . . On those training missions where a pilot under instruction is the pilot in command, the instructor's guidance shall be advisory in nature and under no circumstances shall the pilot in command be relieved of his authority and responsibility."



Blue water OOPS!

By LT John Maher
VF-114

IT'S a perfect day for flying, after a 5-day inport period and 2 days of steaming. The South China Sea is as smooth as glass, the weather CAVU, and the winds dead calm.

My flight is to be a sunset launch and a night recovery. The brief is thorough. We receive a good lecture on our diverts. One is Songrich International – a civilian airfield with no TACAN or UHF, but ample runway. The other is Fourgo – a military airfield with TACAN and ample runway, but requiring an hour notice to be useable on Sunday. However, we had received a message from the Songrich government requesting us not to use their airfields unless it was an emergency. Therefore, we are conducting a *blue water operations* policy. Regardless of our problem or fuel state, we will land back aboard. No sweat. Part of an air wing's training is to develop this capability.

Briefed and suited up, the time arrives to man-up. Forty-five minutes later, we're positioned on the No. 3 catapult. A good check of the gages, a smart salute, and off the deck we go.

An hour and a half later, on station, the last rays of sunlight disappear and darkness sets in. With our patrol mission complete, we check in with Marshal and receive our holding pattern instructions. As we near our holding area, I gaze outside and count 16 aircraft with their exterior lights on. It looks like we'll be the eighth one to commence our approach to the carrier. We punch our clock, and start that tedious mathematical process of commencing on time. Just as we make our last turn in holding, we hear, "Marshal, Darkcat 210, our flaps won't come down. We've investigated the problem thoroughly, and they're locked up." Within a minute Marshal broadcasts, "99 aircraft, signal Delta. Stand by to update times." Twelve minutes are added to ours. No problem. Since I was first indoctrinated into aviation, I have always taken to heart my first lead's wisdom: "Never leave runway behind you, and never dump gas around the carrier until the last possible minute."

Once again, the back seat radio comes alive. "Darkcat 210, this is the skipper. I've talked it over with the Captain and CAG, and we're going to take you aboard. It's going to take us about 20 minutes to get the 31 knots of wind required to take you aboard. Meanwhile we'll go ahead with the recovery, so you're going to be the last F-14 down."

Six minutes had passed now. Once again, the only game in town begins. We hear the first 300 series A-7 commence. Down below we can see the five aircraft ahead of us adjusting their pattern to commence 1 minute behind each other. We, too, are adjusting our holding pattern to make our approach fix on time.

"Marshal, Paygrass 104's commencing on time, fuel state 6.5." "Roger 104, switch to button 16." Up ahead, I hear the familiar phrase, "301, on glide slope, slightly left of course, ¾ mile, call the ball." "301, Corsair ball, 2.7, auto." "Roger, ball, auto, 26 knots of wind, keep working on your lineup . . . a little power . . . right for lineup – right for lineup!" Meanwhile, Approach continues to set each aircraft up for its attempt at landing aboard. It seems to me that the radios are breaking up. I only hear a partial ball call, followed by a barely discernable "Wave off, foul

deck" from the LSO. Before I have a chance to ask my RIO if it's our radio, I hear the LSO attempting a radio check. Approach waits a few minutes, and then we hear, "Paddles, Approach. How do you hear this transmitter?" "Weak but clear; how us?" "Read you same. We've switched radio transmitters." "Paddles, Roger . . . 99 aircraft, we've had to pull the 4 wire. We had no 3 wire at the beginning, so we'll be working with only 2 wires and less hook-to-ramp clearance. So, no big plays in-close. Be nice and smooth and we'll get you aboard." The familiar voice of the air wing LSO. It's amazing how confident he can make you feel in a business that nobody pays you enough to do.

Time seems to be speeding up now. The next three aircraft call the ball, and with a few helpful calls from Paddles, trap aboard. The radios still seem to be breaking up. No time to worry about it, because it's our turn. "104, crackle . . . line . . . call the ball." "104, Tomcat ball, 5.8, auto." Nothing! Oh well, lineup looks OK, and the ball's about one-half cell high. There go the green cut-lights. Got to make this one count; almost there. "Wave off, foul deck," comes faintly over the radio, as the waveoff lights start flashing. As I apply full power and start to climb over the carrier deck, we hear "104, Approach, how do you hear this transmitter?" "104, hear you very weak but readable." "Roger, take angels 7 overhead."

Now what!? I've never read this procedure in the CV NATOPS. As I start my climbing turn back toward the ship, something happens. Something so strange and unbelievable, I have to ask my RIO to confirm it. The ship has disappeared! All those red and white lights used to outline the landing area and the flight deck are gone. All I can see in its place is a black void. Unconsciously, I can feel my left hand apply full power and start a climb. Our fuel state is right at a day VFR emergency bingo, and no life seems to be coming from the ship.

We're out of here! I continue to climb up to bingo altitude and take the heading my RIO says will point us toward our divert airfield. It wasn't until we were 50 nm outbound from the ship that we could faintly hear the ship broadcast, "99 aircraft, your signal – Bingo. Pigeons 220 degrees for 200 nm. The ship has had a complete electrical failure." The twelve aircraft airborne are now diverted to the beach.

We are all lucky this night. The only foreign field open hears us declare an emergency. Even though the field has no TACAN or final approach control radar, the clearness of the sky permits us to see it about 50 miles away. We all land, not on our carrier, but at a foreign field some 200 miles away.

Later that night, we all discuss the night's events. You might say, for every cold beer, there was a lesson learned:

- No matter whether you're *blue water ops* or playing the bingo game, know your diverts. Thoroughly brief all of their operating times, their geographical location, and any foreseeable problems in getting there, especially if it's a foreign country.
- Even when you're operating under *blue water rules,* keep apprised of the bearing and distance to the nearest suitable divert, and know the bingo profile.
- Get a complete brief on the present and forecast weather. Most important of all, know how it could affect a bingo situation. We all concluded that, had there been bad weather, finding the field with no TACAN, ADF, or final approach control would have been difficult.
- When more than one aircraft bingo, the confusion is proportional to the number of radios being keyed. Your priorities should be to establish your bingo profile, turn to the bearing for the nearest divert, and relax! Listen to see if there is another aircraft ahead of you transmitting. Chances are good, if there is no center controlling facility or you're more than 100 miles away, nobody's going to hear you. Go ahead and make an emergency broadcast of your problem twice, but if no one answers, there are other tasks demanding your attention. Make sure you're squawking 7700. If you are

INS-equipped, update it to make it as accurate as possible. If you're not INS-equipped, try to join on a buddy that is, or get a vector from an airborne E-2 or another INS-equipped aircraft. If unable, your divert brief and DR plot become mighty important. Pull out the cross-country packet, and read over all the information available on the divert field. Note its geographical location and any prominent land features. If your radar is capable of painting land masses, use it. Hopefully, by the time you've accomplished all these items, you or a friend up ahead will be close enough to talk to the field.

- If you go to a foreign airfield, talk slowly, calmly, and in plain English. Using carrier slang (pigeons, bingo, 99 aircraft, etc.) will only confuse the controller. Just declare an emergency and pretend you're on your checkflight for TWA.
- If you find the field and have enough gas, take the on-scene-commander role. Try to help those aircraft having a problem finding the field. If someone is low state and a tanker is airborne, make sure the tanker gets the message and goes to the rescue.
- Once you land, the senior officer should get in touch with the nearest American Embassy. Make sure they know why you landed and what assistance you require, particularly if you are carrying live ordnance. They can also establish communications, so you know when to return to the ship.
- If you're lucky like we were, a friendly airline like Quantas will help park and service your aircraft, and provide transportation for the aircrews. We also discovered that the air, nitrogen, and starting units for the 747 were compatible with our airplanes.
- Be professional – what could be simpler!

Come Fly With the Best!

THE United States Navy Flight Demonstration Squadron, the Blue Angels, will soon select three pilots, one of which will be a representative of the United States Marine Corps, and a Naval Flight Officer for the 1981 team. Final selections will be made in September 1980, but interested officers are encouraged to submit their applications as soon as possible.

Applicants should be tactical jet pilots or Naval Flight Officers with 1500 hours flight time and rolling to or on shore duty. Letters of application should be endorsed by the respective Commanding Officer and forwarded to the Navy Flight Demonstration Squadron, with a copy to the Chief of Naval Air Training, and the Chief of Naval Personnel (Pers-433A) or Commandant of the Marine Corps (Code AA). All letters of application should specifically include each officer's experience and qualifications.

Questions regarding application or comments concerning the mission of the Blue Angels are invited. Write: Commanding Officer, Navy Flight Demonstration Squadron, NAS Pensacola, FL 32508, or phone Autovon 922-2583 or Commercial (904) 452-2583.

Is red dead?

A Look at Warning Colors

By LTJG Paul Blackford, USN

"MELLOW YELLOW!" Well, it was a good song, but singer Donovan would have been more timely if he would have used the lyrics "red is dead." The next time you taxi out in your flying machine, take a look at the crash trucks. There's a good chance that they are some form of yellow rather than the traditional red.

The crash trucks are yellow, so what? I'm glad you asked that question, because the reason has some very definite applications to aviation safety.

Before actually giving you the answer, a little background on how we see and distinguish colors is in order. Color, in the form of light, enters the cornea, which is crystal clear, and then proceeds into the interior of the eye by way of the pupil. From here the light is focused on the retina at the back of the eye, and this is the only place where color may be interpreted. The light receptors at the back of the eye that are receiving this light are called rods and cones. The cones are chiefly responsible for color vision and sharp acuity. Conversely, the rods are generalized light detectors that determine gross shape or outline. The center where this light strikes is composed almost entirely of cones and, moving away from the center of the retina, the cones decrease and the rods become more prevalent. What is important about the rods and cones is that in daylight or bright illumination, the cones are the receptors, sending visual messages to the brain; in dim illumination, the rods or peripheral vision areas send impulses to the brain. (Remember the night vision trainer – don't look directly at what you're trying to see.)

Now, an interesting fact about these rods (night vision) is that they are totally blind to red colors and are most sensitive to light on a wavelength of about 510 millimicrons (Fig. 1). The cones are somewhat sensitive to red, but are most sensitive to light at about 555 millimicrons (Fig. 1). What this actually means is that red, with a wavelength of approximately 650 to 750 millimicrons, is a difficult color to see. At night, the only red we see is that of sufficient brightness (such as lights) to be detected by the cones. This wouldn't be quite so bad if the daytime retina and the nighttime retina could function simultaneously, but this is not the case.

They (rods and cones) are sensitive to different intensities of light. Once there is sufficient illumination to see red objects, your night vision is gone and a readaptation period is needed.

If you made it this far, you now know why that crash truck and many fire trucks around the country are no longer the traditional red, but are becoming a mixture of yellow and green. More specifically, lime yellow. Figure 2 shows that green has a wavelength of 500 to 560 millimicrons, and yellow 560 to 592 millimicrons. These are wavelengths available to either the rods or the cones and not limited to the cones, as in the case of red.

Now take a look around your aircraft. Chances are that everything from the plugs and covers to the danger areas are color-coded red. Ever heard of a P-3 going flying with an oil cooler plug in? It obviously wasn't seen, and it may not be seen even if it's lime yellow, but it sure stands a better chance.

Red has always been a traditional warning color and has a definite psychological impact. Should it stay this way? I think not! Tradition is fine in areas such as uniforms, but has no place in the area of safety.

All technical information was received from Dr. Stephen S. Solomon of Oswego, New York. Dr. Solomon holds a B.S. as well as a Doctor of Optometry degree and is the pioneer of the shift from red to lime yellow in our nation's fire departments.

Light of wavelengths below 400 MU and above 750 MU are filtered out prior to reaching the retina.

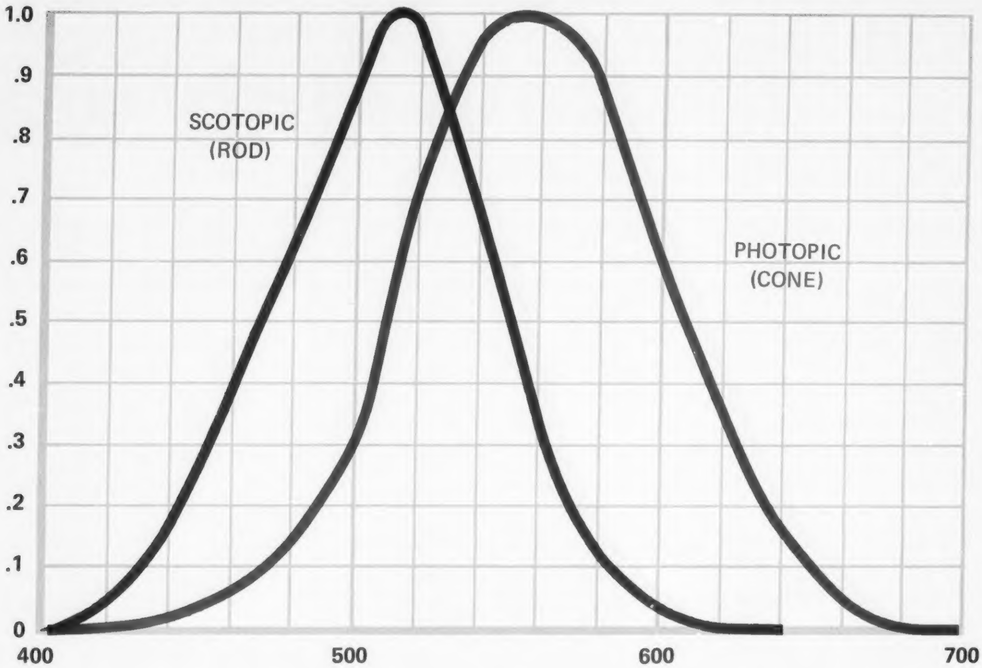


Fig. 1

Wavelength (Millimicrons or MU)

Curves illustrate sensitivity of normal human eye with respect to various colors of the visible spectrum.

The scotopic (night seeing) curve is 0 percent (zero) visible after about 620 MU.

The scotopic peak (color most readily visible at night) is about 510 MU.

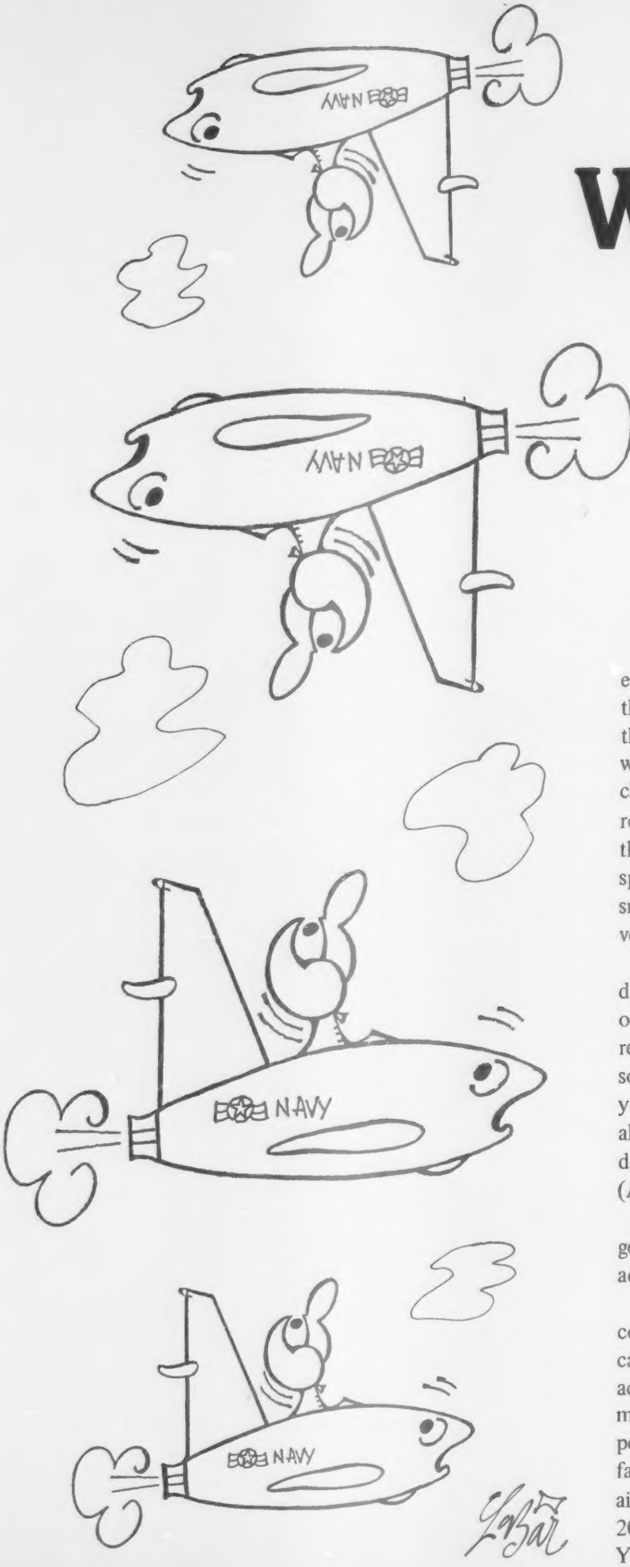
The photopic peak (color most readily visible during daylight) is at about 555 MU.

Wavelengths of Color

Color	Wavelength Range (millimicrons)
Violet	400 to 446
Blue	446 to 500
Green	500 to 560
Yellow	560 to 592
Orange	592 to 650
Red	650 to 750

1 MU = .000001 millimeters

Fig. 2



Which way is up?

By CDR V. M. Voge, MC

SPATIAL disorientation is a term which many of you equate with vertigo. Many of you also equate vertigo with the coriolis effect. This is probably because all of us go through the same physiological training every 3 years, which usually consists of a demonstration on the *Barany* chair (remember – one or more *volunteers* were put in the rotating chair; we watched them spin for a few moments; then we watched their eyes and walking ability when the spinning stopped). This, my dear fellows and gals, is just a small part of the ***real world*** of spatial disorientation and vertigo.

All of us who fly have suffered the effects of spatial disorientation or vertigo at some time or other, to a greater or lesser degree. If you claim not to have, you either: can't recognize its signs (a very dangerous situation); have something wrong with your inner ear (better check with your friendly flight surgeon); are one in a hundred (do you always fly straight and level, with a visible horizon, in daylight, on clear days?); or tend to be less than truthful (Aha! Caught ya!!).

As you can see, there's nothing "unmacho" about getting disoriented. It happens to the best of us. The usual advice given is "get on your instruments." Sound familiar?

Disorientation is a very serious problem in the military community. It has been cited as a definite or suspected cause factor in at least 6.6 percent of all major aircraft accidents over the last 10 years, and 8.6 percent of all major aircraft accidents for the year 1978. Of these, 64 percent were fatal in the 10-year study, with 75 percent fatal in the 1978 study. Disorientation is no respecter of aircraft community: 64.5 percent were in fighter-attack, 20.5 percent in helos, and 15 percent in cargo/ASW, etc. You can see that the numbers are somewhat higher for the

fighter/attack community. This does not indicate that fighter/attack aircrew are more susceptible to disorientation (although this may be the case), but rather that things happen much more rapidly in that community, e.g. – before a fighter jock has the opportunity to recover, or think about instruments, or just simply realize that he is disoriented, it's too late. (Remember we are only talking about *major accident* figures here.) The helo drivers are in second place, not because they fly at MACH 2, but because they are usually close to *terra firma.* Again, the mishap happens essentially for the same reasons as for the jet pilots.

Interested? You should be! One of the best methods of overcoming and coping with disorientation is to understand it – when it happens, why it happens, what its manifestations are, and how to deal with the situation. We're sure you're not interested in a scholarly treatise on the subject. You want to know and understand the basics in clear, down-to-earth language. Right?

With this article, we will begin a monthly APPROACH series. Each of these articles will talk about two or three different types of disorientation, what causes each, and how to avoid or cope with each. The last article in the series will deal with general causes and coping mechanisms that will work in most cases. A word to the wise. If you want to keep your own file on this series, please don't retain the wardroom copy for your personal use. Either "burn" a copy or write to us here at APPROACH. We'll be glad to send you as many copies as you may need. By not letting the next guy in line read these articles, you may help to make him a statistic in next year's computer readout. OK? Ground rules clear?

The body's balance sense organs (primarily the inner ear and eyes) do a pretty good job for us on land when there are only five points of reference (two translational and three rotational). We tend to orient ourselves to *gravitational vertical.* But put us in the air – add just one more translational point of reference – and the sense organs are easily confused. First, spatial disorientation does not necessarily equate to vertigo. Spatial disorientation usually has to do with the tricks our eyes play on us. Vertigo, in the pure sense, has to do with the tricks our inner ears (vestibular systems) play on us. The word *vertigo* comes from the Greek word *turning.* Vertigo and spatial disorientation, of course, may at times join forces to work against us.

In this first article, we are only going to consider the **coriolis effect,** which is probably the most familiar to the majority of you. This sensation is a form of vertigo. Remember your physiological training and the *Barany* rotating chair? The disorientation produced is the coriolis effect. It is generally described as a sensation of rotation or abrupt rolling and/or pitching. Your inner ear has three semicircular canals filled with a liquid called endolymph – each located in a different plane to capture movement in that plane, i.e. – roll (x), pitch (y), and yaw (z). The coriolis illusion is called a "noncoupled stimulation with head movements," and is produced when a new input is given to the semicircular canals after they are already being stimulated. At least two of the canals must be stimulated in order to produce this illusion.

Frequently, two of the canals coordinate to produce one effect, as in a climbing right turn. We usually have no problem recognizing this sensation, as it is "natural," and the feedback to our brain from the canals makes sense, so to speak. But when we turn our head to look over our shoulder during a pitchback, or when our head is turned downward after entering a spin, or when we move our head up or down during a turn, we experience rather weird sensations. The input to our brain under these circumstances is completely foreign to what the brain has become accustomed to, i.e. – the brain is confused. It usually gives us the feedback it perceives, which can be quite bizarre. A case in point:

- **During a ground controlled approach, a pilot tried to make visual contact with another aircraft. When he again looked back at his instruments, he felt as if he were upside down! Cross-checking his instruments showed that he actually was flying straight and in a slight climb!**

The threshold of experiencing the coriolis effect has been found to be as low as 0.1 rpm, or 1 degree of turn per second. As can be seen from the example above, this illusion is particularly likely to occur during the critical phases of flight, i.e. – prior to landing, during ACM, on bombing runs, etc., when the cockpit chores distract one's attention from what is going on, or when we lose our plane of reference.

What should you do when you experience this illusion?

- Recognize and admit that you're disoriented!
- Get on the instruments! Don't believe what you perceive to be your attitude. Instruments' failure rates are minimal in comparison to our brain's capacity for confusion.
- Try not to make head movements when the aircraft is in a spin or sharp turn, especially when IFR. Don't lean over to pick up equipment or to adjust controls. This illusion is probably one of the most dangerous and devastating illusions experienced by aviators because its quality is disarming and because it frequently occurs in maneuvers made close to the ground. One should **not** try to "correct" one's attitude while under the influence of the coriolis illusion, unless the correction is made using instruments only.

Next month, we'll discuss the *leans,* the *graveyard spin,* and the *graveyard spiral.*

High, hot, but on the spot

FOLLOWING the first of several planned ACM engagements, LT Dan Martin assumed the lead of a section of two A-7s for the start of a second engagement against a single F-14. During the engagement, and while in a left turn at approximately 320 KIAS and 3G, LT Martin experienced hard airframe buffeting. Thinking the heavy buffet was caused by high AOA, LT Martin released back pressure and continued the engagement. After 20 to 30 seconds of additional maneuvering, LT Martin again experienced heavy buffeting and felt that the aircraft was not recovering from the buffet properly. He discontinued the engagement and requested his wingman to visually inspect his aircraft. It was reported to LT Martin that his starboard aileron was broken at the hinges and appeared to be about ready to depart the aircraft.

LT Martin immediately slowed the aircraft, turned towards MCAS Yuma, and extended gear and flaps. As the aircraft was slowed below 200 KIAS, it began to vibrate excessively. At 170 KIAS the wingtips began to flutter up to 6 feet. LT Martin decided that slowing the aircraft further may cause major structural failure, so he eased the nose over, added power, and raised the gear and flaps. All vibrations ceased above 210 KIAS.

LT Martin then decided to slow the aircraft and try various flaps settings. This first attempt was at full leading edge flaps and zero trailing edge flaps. In this configuration the aircraft began heavy vibrations as it decelerated through 200 KIAS. LT Martin then slowly lowered the trailing edge flaps to 15 degrees and felt the aircraft was relatively stable in all three axes. He requested a straight-in approach to MCAS Yuma with a maximum airspeed arrested landing.

LT Martin flew a flawless approach at 190 KIAS, which was extremely difficult considering the high possibility of porpoising at such a high approach speed. He engaged the shortfield arresting gear at 170 KIAS without incident. LT Martin's coolness under extreme pressure and his professional airmanship saved the Navy a very valuable aircraft. Attaboy!

ENGINE LOSS

SUDDEN, complete, and catastrophic failure of an aircraft engine right after takeoff is very unusual; yet, every pilot who has ever flown has had the possibility drilled into him. Pilots of single-engine aircraft know the most important thing is to continue straight ahead. Pilots of multiengine aircraft are taught to fly and maintain airspeed first, announce their problem, and then ease the sick bird into some safe haven.

Let's take a look at a couple of pros at work. LCDR James D. Durbin made a wet takeoff in a C-131, at high gross weight, from Port-au-Prince. Just after raising the gear and leaving the field boundary, still at max power, he heard and felt a series of backfires from the No. 2 engine. Flames were reported coming from the No. 2 cowl flaps. The starboard engine throttle was reduced, water injection was secured, and the No. 2 prop was feathered.

The aircraft had reached 500 feet by this time and was indicating 135 knots. LCDR Durbin continued an easy climb while turning downwind. He climbed to 700 feet with maximum power on No. 1. A single-engine approach was continued and, on short final, flaps were lowered to about 25 degrees and an uneventful landing ensued. During rollout, the pilot reversed No. 1 to help stop on the runway. LCDR Durbin taxied to the ramp and secured the aircraft. No damage was incurred from the backfires, or the fire and smoke. The cause of the trouble was a bad distributor. It was replaced and a successful checkflight was flown.

Another set of pros, LTJG M. M. Miro, and his crew from VP-17, were airborne in their P-3, climbing through 5000 feet, when a muffled bang was heard on the port side. Immediately after the bang, there was a noticeable loss of power on No. 2 engine. The No. 2 firewarning light and horn actuated.

The engine was secured with the E-handle, the fire extinguisher was discharged, and the emergency checklist was completed. The firewarning light went out and a visual inspection of the engine was conducted with nothing seen. About 20 seconds later, the firewarning light came back on and continued to cycle on and off, without any other evidence of smoke or fire.

LTJG Miro turned back to base, declared an emergency, and prepared to make an overweight landing. He did not want to dump fuel due to the proximity of the fuel dump chute to the No. 2 engine. He made a routine landing. After rollout, when he had to use moderate braking to slow down, he turned the P-3 off the duty and the next problem, smoking port brakes, reared its ugly head.

The PPC stopped the aircraft on the taxiway and the brake-fire checklist was completed. The crew and passengers evacuated through the starboard over-wing exit.

Later, an inspection revealed the forward section of the engine turbine casing had a large section torn away, splits in other places, and many cracks throughout. The turbine rotor blades and vanes were severely damaged and the firewarning element had shorted out. The engine was removed and sent for a rework and a DIR.

A functional checkflight was conducted after a new engine had been hung, and no discrepancies were revealed.

In both incidents, it is readily apparent that the pilots were mentally and emotionally prepared for the engine failures. It is also apparent they had briefed the possibility, and the crews responded quickly and correctly. There was no panic, no indecision, no confusion. Way to go, gents. We award you a well-deserved Attaboy!

Water in Fuel Tanks

THE importance of obtaining fuel samples as per the "turnaround card" cannot be overemphasized. The C-9 aircraft has a tendency to condense the water vapor in the fuel tanks as the fuel is used. The condensation equals about 1 quart of water per tank per day. At the end of a recent C-9 deployment of 29 days, the main fuel tanks were found to have had about 10 gallons of water per tank! JT8D engines don't need water injection, so follow proper preflight procedures and check those fuel samples.

VR-55 Safety/NATOPS Newsletter
NOV '78

This article concerns the entire aviation community, not just the Skytrain II's. Don't neglect any phase of preflight – follow checklists. – Ed.

Should buffs blow their tops?

By LCDR R. S. Pearson
VA-75

WHEN was the last time your crew briefed whether or not to jettison the canopy prior to ejection? Apparently, not many brief it, or they are overly pessimistic about the canopy leaving the aircraft. The records show that there have been 12 ejections since 1969 where the canopy was jettisoned. **Every one** was successful and the crews incurred no injuries due to canopy impact on ejection. Of interest, though, is the fact that all ejections involving jettison of the canopy occurred between February 1969 and May of 1972. Although there have been 66 A-6, KA-6, and EA-6A ejections since May 1972, **no one** jettisoned the canopy!

So, let's take a look at what can happen if you do eject through the canopy:

Table 1

		People
Number of ejections through the canopy (A-6, KA-6, EA-6A) 1969-1979		104
Injuries/damage due to canopy impact:		
• Abrasions	10	
• Lacerations	13	
• Damaged Boots	5	
• Fractures (plus abrasions/lacerations)	6	
• Fatal (aircraft impacted other aircraft on flight deck, B/N's seat struck canopy bow, only reached 25 feet altitude)	1	
• Other (*Plexiglas* stuck in lapbelt – could not open)	1	
• Total		36
No injuries due to canopy impact		44
Fatalities not due to canopy impact		24

Note: Injuries on through-the-canopy ejections were reduced by using the face curtain and wearing flight suit sleeves rolled down with gloves on, visor down, and O_2 mask tight.

As Table 1 shows, about 35 percent of ejections through the canopy result in injuries due to striking *Plexiglas* or the canopy bow rail on egress. Although these injuries are mostly classified as minor, these injuries occur most frequently to the upper extremities, e.g. – hands and arms. Lower extremities are injured slightly less frequently. Injuries, even of a minor nature, to these areas could seriously aggravate the survival problem, especially in a water survival situation where disengagement of parachute shroudlines and deployment of emergency equipment requires the use of hands and arms. Indeed, at least three of the 24 fatalities listed in Table 1 were lost at sea after apparently normal ejections. There is a possibility that these crewmen were rendered incapable of surviving by canopy impact on egress.

When would you consider jettisoning the canopy? Obviously the answer varies from crew to crew and situation to situation. However, those six accidents where the crew did jettison the canopy fall into three categories: flameout, fire, and loss of flight controls. These six accidents ended in ejections between 600 and 12,000 feet, and 200 to 250 knots airspeed. All six aircrews ejected about wings level with low rates of descent. Using the parameters noted above, my analysis shows approximately 10 accidents between May 1972 and March 1979 where jettisoning the canopy was a feasible alternative. In these 10 accidents, involving 20 ejections, **one-half** of the crewmen sustained abrasions or lacerations, or both, due to canopy contact.

There are two obvious drawbacks to jettisoning the canopy on ejections: delay in ejecting; and the possibility that the canopy might jam and preclude ejection. Since ejecting out-of-the-envelope due to delay is a major factor in recent ejection fatalities, any recommended action causing delay must be carefully considered and fully briefed in advance. As for possible jamming of the canopy, there is no record of such an event actually happening. The canopy jettison system has been flight tested to 220 knots and actually jettisoned up to 250 knots with no discrepancies.

What, then, should each crew brief concerning jettisoning of the canopy? First, they should brief the conditions under which they intend to jettison the canopy. This may include flameouts, fires, and loss of flight control. But, it might also include an aircraft preparing to leave the flight deck after a brake failure.

Second, who would jettison the canopy? In a controlled ejection, the pilot's jettisoning of the canopy may be the signal for the bombardier/navigator to eject. Conversely, the pilot may be too busy and the bombardier/navigator may want to jettison the canopy. This must be prebriefed to preclude one crewmember attempting to eject through the canopy while the other is jettisoning the canopy.

Obviously, there are many situations where immediate ejection through the canopy is the only safe egress method. However, there exist a number of situations where jettisoning the canopy will not only reduce your injuries but may also **save your life.**

Terrain and the downed flier

By Capt M. Stopani-Thompson

AFTER a crash or a forced landing, a downed flier resorts to his personal beacon to increase his chances of rescue. This is a very wise move because having a beacon greatly increases his probability of rescue. From a technical standpoint, mere operation of a beacon without consideration of the theoretical side of its operation throws different weights on the wisdom of that decision. The purpose of this article is to cast some light on optimizing the operation of a beacon such that the radius of detection is maximized within the constraints of personal injury, nature of terrain, and mobility over terrain of the downed flier.

It must always be remembered that UHF transmitters operate on the line-of-sight principle. Anything that gets in the way of the radiated energy will shadow the search aircraft antennae and reduce the chances of detection.

Typically, due to the low output power of personal beacons, search aircraft require large external antennae which restrict available devices to simple left-right homers. Beacon power output is fixed by the manufacturer and degraded by real-time battery condition. Signal-to-noise ratio of the homing device is also fixed, *so the burden falls upon the downed flier to do what he can to increase the effective output power of his one and only beacon.*

What factors affect the range of detection? The partial list of answers is as follows: vegetation, terrain, height above ground, and weather. The last factor can be dismissed as everybody talks about it but nobody can do anything to it. This leaves only three main factors worthy of consideration.

The first factor is the ground. There is considerable amount of theory to show that the conductivity of it greatly affects the radiation pattern, the input impedance, and the power gain of the antenna. The magic words here that the downed flier must remember are POWER GAIN, but how does one guess at the conductivity of the ground in order to get it? Computer calculations show that if you increase the height of the beacon above ground, the

Table 1 – 243 MHZ SAR A/C at 8000 feet AGL

TERRAIN	ANTENNA HEIGHT	RANGE FOR 50% RECEPTION
Mountains	0	18 NM
	4	22
	8	24
Plains	0	26 NM
	4	30
	8	36

conductance of the ground plays less and less of a role in decreasing the radiated power.

Consider Table 1, which tabulates the results of calculations for a rescue aircraft (flying a course tangent to the beacon circle of radiation and having a 50 percent chance of detection) for various heights of a beacon antenna above ground. This means that if a SAR aircraft approaches closer to the beacon, the chances of detection increase; if the SAR aircraft is farther away, the probability decreases below 50 percent. This 50 percent becomes the *average* upon which to build the rules listed below. Note that all the rules are relative to each other.

Rule No. 1. Raise the beacon to a reasonable height above the surrounding terrain. For example, place the beacon on a boulder in a flat arctic plain and wedge rocks around it to prevent it being blown off; farther south, tie it to a tree or a pole. Remember that reception range is increased typically by 20 to 40 percent when the base of the antenna is raised 8 feet above ground level.

The second factor is terrain. This tends to be decided in that instant in time when your engine sheds turbine blades like a tree sheds leaves in a fall storm. In that deadly hush when all airmen wish they were home having a beer instead of earning flight pay, the terrain becomes fixed into one of three basic categories:

- Plains (very smooth to slightly rolling).
- Hills (rolling plains and hills).
- Mountains (mountains to extremely rugged mountains).

Once the downed flier finds himself to be at last safe with feet on the ground, he wants to be found – and found fast! If it's raining and he decides to carry his beacon into a handy nearby cave to keep him company, then the only way he will be detected is if the search plane flies through the entrance! In exactly the same manner, if the downed flier finds himself to be at the bottom of a steep gully, he must expect that the radiation pattern will be severely restricted by the sides of the gully. The search aircraft will have to almost be on top of him to detect the beacon.

Rule No. 2. The more open sky the beacon sees, the longer will be the range of detection.

To abide by this rule, carry the beacon to higher terrain and then magnify the range by using Rule No. 1 to increase its height above "ground."

A variation of all terrain is the consideration of the vegetation that grows on it. Considering the tall variety called trees – which can be gathered into three groupings: lightly, moderately, and heavily treed terrain – it can be blandly stated that because they interfere with the line-of-sight of the beacon to the search aircraft, trees will reduce the maximum range of beacon detection by SAR aircraft. A downed flier must expect that when operating his beacon on the woodland floor, even with a good conductive ground, he will get 25 percent less range in moderately treed and 45 percent less range in heavily treed terrain over what he could expect to get in lightly treed, similar terrain.

Rule No. 3. If you cannot see the sky for the trees, move to where you can.

This is seldom possible unless an open lake shore is handy – so common sense says to revert to Rule No. 1 and raise the beacon as high as possible into the trees. For example, use parachute cord to get a weighted line over a high branch *before* lashing the beacon to the line and hauling it gently up in the air. Leave the weight on the line to aid in lowering it back down.

There is one last rule to be considered, but it has nothing to do with terrain. It concerns beacons that have a radio transmitter and receiver in them. All quarter wave length antennae generate radiation patterns that roughly resemble a doughnut. Because a SAR aircraft will be using a left-right homer against low-power beacons, the typical homing run will be done at constant altitude. The detection of the cone-of-silence, or the hole in the doughnut pattern, tells the SAR aircraft pilot that he is very close to the beacon. The pilot pinpoints on his map the spot on the ground where he lost the signal on entering the cone-of-silence and flies the same course until he picks up the signal again on the other side of the doughnut hole. Visually noting this second position on the ground, the pilot splits the distance and spirals in on the location of the beacon.

If, however, the downed flier snatches up his beacon and changes to voice, he has to tilt the antenna to get radiation energy to the SAR aircraft. The SAR aircraft will continue along its course as the homer uses the voice energy until the pilot realizes that he has lost the beacon signal, possibly as far as 30 miles away, and has to come back. It is even possible that the pilot won't hear the downed flier's voice depending on switch positions in the aircraft and the audio chopping feature of the homer that renders speech unintelligible. The pilot usually has to switch to 243 MHZ guard channel to hear voice or check on the beacon signal.

Rule No. 4. Use the radio portion of the beacon with discretion. Preferably wait until the SAR aircraft begins to circle above you.

The use of these four rules will assist in making your use of a beacon as optimum as circumstances allow. As they say, they may give you the razor's edge at the very time that you need it most. They should bring you back for that beer you contemplated prior to using the silken umbrella.

Adapted from *Flight Comment*

LETTERS
to the editor

Re: "Thankful" – DEC '79

NAS Miramar – My compliments to the superb coordination and courage displayed by the crew of the burning F-14 and all hands on the USS EISENHOWER. This outstanding effort saved the Navy a very valuable F-14 *Tomcat.*

However, one question came to mind as I read your article. What would APPROACH have said if the F-14 controls had burned through and control was lost at the ramp with the aircraft impacting the carrier? NATOPS is very explicit in regard to a confirmed fire airborne; it calls for ejection.

A recent CNAP force safety article specifically addressed the question of aircrew staying with an aircraft longer than is necessary. My concern is that many aircrew will read APPROACH and draw the conclusion that they should stay with an aircraft and compound an already marginal situation by trying to bring it aboard the carrier. I'm curious to see if any other readers felt the apprehension I did after reading your article.

Jay B. Yakeley
Safety Officer, VF-124

● **The decision to trap aboard in the subject incident was a judgment call on the part of the aircrew and the ship. Because of flawless execution, it proved to be the correct decision. Our intention was not to encourage unnecessary risk taking, but to report a well handled emergency.**

More Gripes!

Washington, DC – I got a kick out of your *yellow-sheet* gripe on pg. 8 of the JAN '80 issue. Two of my favorites:

Gripe: "Copilot's relief tube is too short."
Sign off: "Stretched copilot."
Gripe: "Port tire almost needs changing."
Sign off: "Almost changed port tire."

LCDR A. S. Polk III
VAW Pilot Flying a DC Desk

Power or Procedure?

New Orleans, LA – I think your synopsis of a CH-53 incident, "Ah, Oh, Unh *@&†" which appeared on page 7 of the OCT '79 issue could use some "rotor washing," if you know what I mean.

In the second sentence, the inference is made that "It was a hot day (little lift available) and . . . " The fact that it was a hot day certainly did affect the total lift available, but I am quite confident that the CH-53D was grinding out a lot of lift, regardless of the temperature. The sentence probably should have been written, "It was a hot day (total lift capability reduced) and . . . "

Also, in paragraph three, the second sentence states that "The helo had entered power settling when . . ." I kind of doubt that the helo was in power settling, which is a rather delicate, unusual phenomenon that, simply stated, occurs when a helicopter, while descending, is flying in its own downwash with limited control available to the pilot. The helo in question may well have been settling downward, and what could one expect when the big bird was being asked to tear up 10 miles of telephone wire, poles and all.

My theory is that if the CH-53 could have lifted the truck off the deck, which the article seems to substantiate, then the bird could well have lifted the truck straight up for 100 feet or more. I think those pilots had sufficient lift in the helo, but they probably just got anxious to start moving forward (who wants to hover in *dead man's territory*) and, in the process, caught the wires before the load was clear of the obstructions.

The problem seemed to be one of *procedure* vice *power available.*

LtCol E. L. Osmondson

● **While procedure in this incident may be suspect, insufficient lift appeared to be the overriding factor. This was very probably due to temperature and humidity factors and the lack of a modified bellcrank assembly (AFC 244).**

Ruffled Feathers

FPO, New York – Although I agree in essence with the intent of LCDR Stubbe's letter concerning flight deck hazards in the NOV '79 issue of APPROACH, I personally take umbrage at his statement that the kinetic energy stored in H-3 rotor blades is "too much for the average man on the flight deck to comprehend."

I am an "average man on the flight deck," and in my over 19 years experience I have rarely, if ever, seen a greater broad-based insult aimed at the enlisted man in general.

The "average man on the flight deck" may not be the holder of a college degree, but before anyone judges another's intellectual capacity in such a manner, I think a hard look at his own capacities and prejudices might be in order.

I personally hope LCDR Stubbe isn't placed in a position of command soon without first trying the above intellectual exercise. If he doesn't, I am afraid he will be greatly handicapped by his attitude, to the detriment of his mission, his men, and the Navy.

With all the effort, man-hours, and money spent to combat prejudices, it appears that at least one got by. Maybe a new course is in order. However, I don't think the potential students constitute a large enough group to make it cost-effective. Most officers are too smart to need it.

A. E. Dickinson

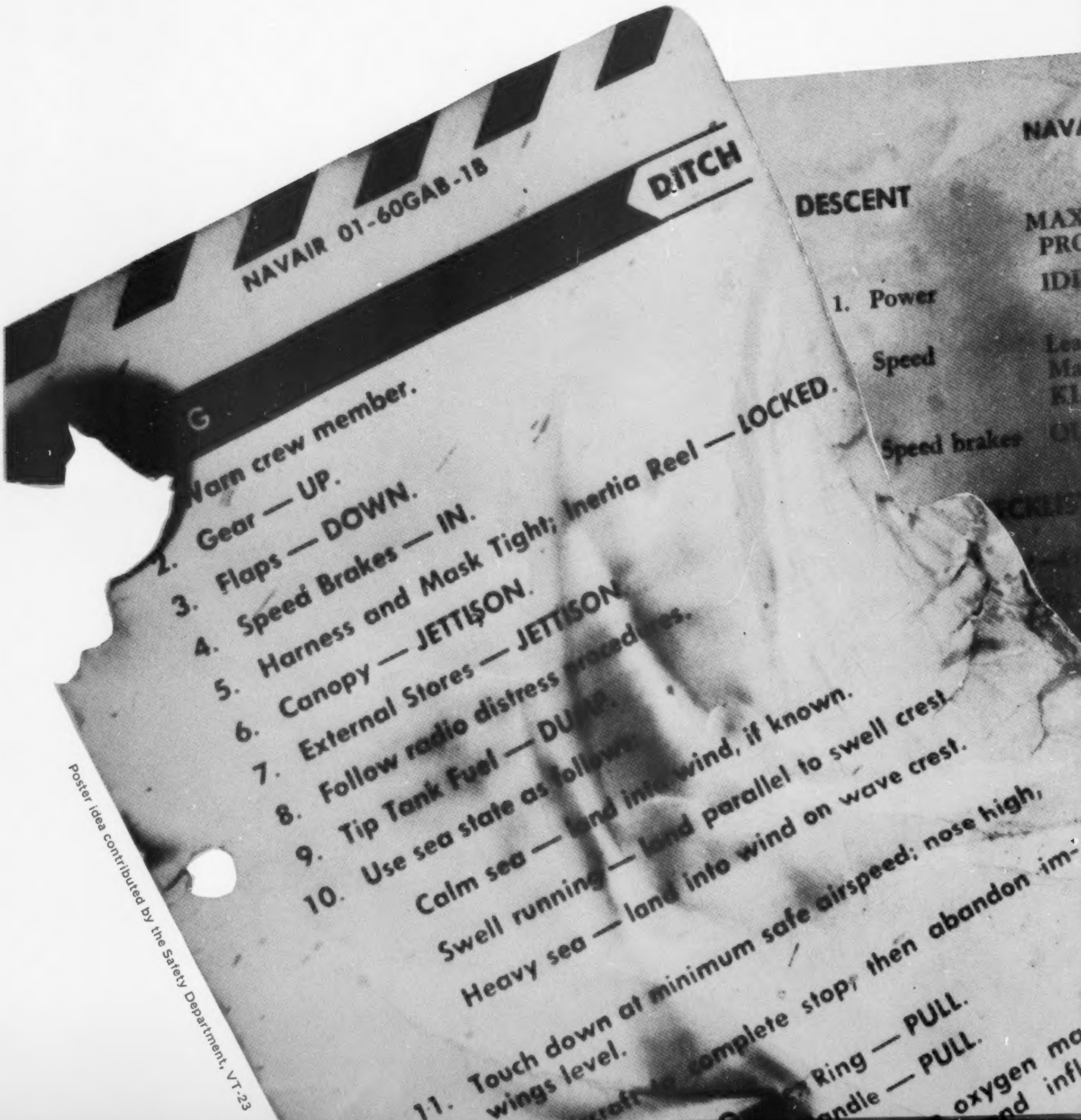
● **Nowhere in his article did LCDR Stubbe limit "the average man on the flight deck" to enlisted personnel. Few people, including admirals, helicopter pilots, enlisted aircrewmen, and civilians, comprehend the havoc that a disintegrating helicopter rotor system can inflict upon personnel and/or equipment in the vicinity. Those who have witnessed such an occurrence are among the few smart enough to stay out of the area unless they have business there.**

APPROACH welcomes letters from its readers. All letters should be signed though names will be withheld on request.

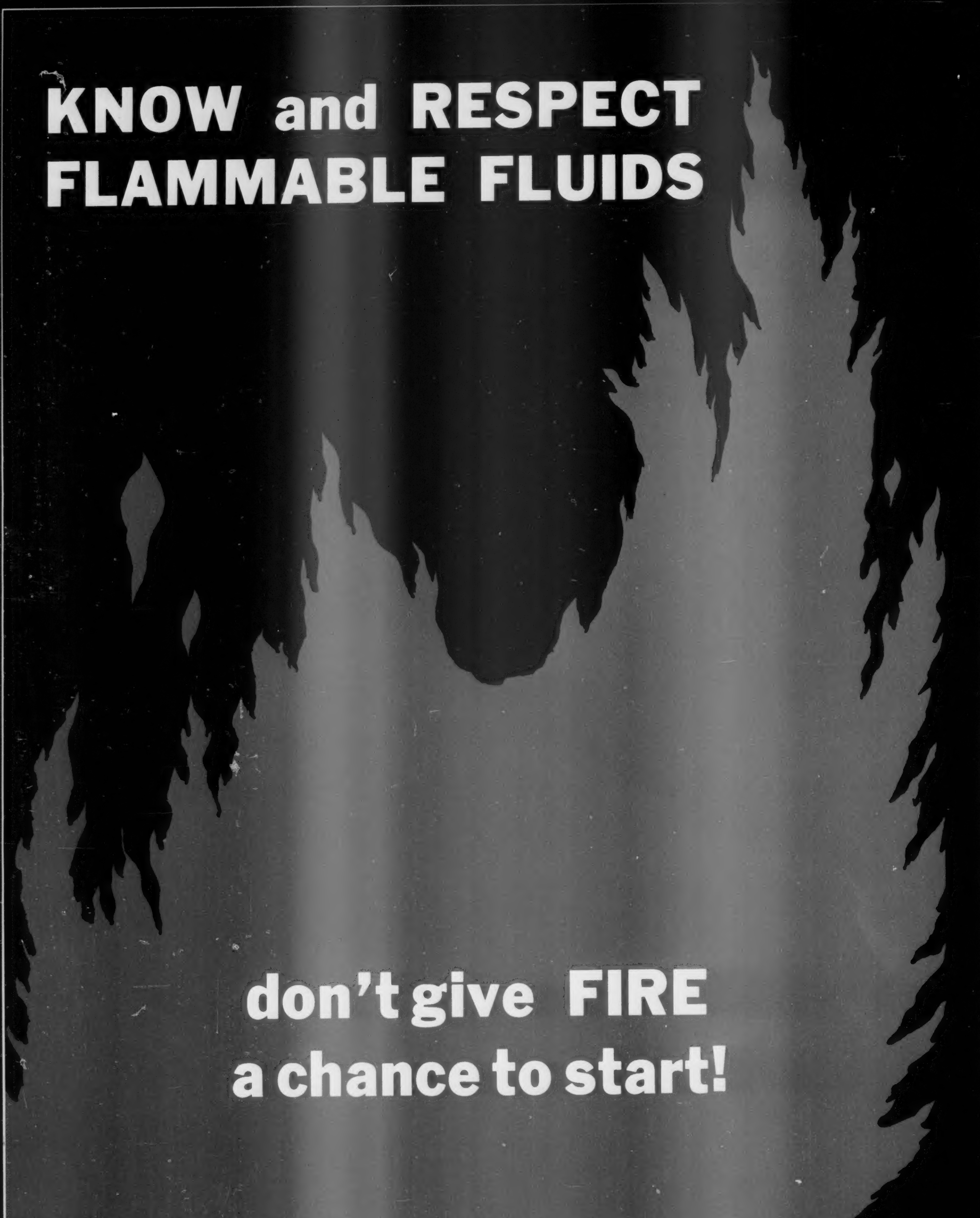
Address: APPROACH Editor, Naval Safety Center, NAS Norfolk, Va. 23511. Views expressed are those of the writers and do not imply endorsement by the Naval Safety Center.

☆U.S. GOVERNMENT PRINTING OFFICE: 1980-635-048/2

The time to study your emergency procedures is before



Poster idea contributed by the Safety Department, VT-23


KNOW and RESPECT FLAMMABLE FLUIDS
don't give FIRE a chance to start!